A revision of *Vitessidia* Rothschild & Jordan and *Vitessa* Moore (Lepidoptera : Pyralidae)

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Synopsis

The genera *Vitessidia* Rothschild & Jordan and *Vitessa* Moore are revised and a new genus is described. Two species of *Vitessidia*, three species of *Cosmethella* gen. n., and twenty-eight species and sixteen subspecies of *Vitessa* are described, of which fifteen species and fourteen subspecies are new. One new synonym, two new status and two new combinations are established, eleven lectotypes are designated. Keys to the genera, species and subspecies are provided, the distributions of the species and subspecies are discussed and are illustrated with maps, and notes on the biology and descriptions of the immature stages are given for *Vitessa suradeva rama* Moore. Wing patterns and genitalia are illustrated for all species and subspecies, and for both sexes where available.

Introduction

This paper revises the classification of three genera of large, conspicuous and at least partly diurnal moths of the family Pyralidae (subfamily Pyralinae). Except for revisional notes on Endotrichini (Whalley, 1961; 1963), there has been no study of the inter-relationships of genera of the Pyralinae since Hampson (1869*b*), who used characters now known to be inadequate. The

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three genera can now be defined as belonging to the Pyralinae from the following characters: chaetosema present; maxillary palpus present; proboscis well developed; fore wing with R_5 stalked with R_4 and R_3; hind wing with *Rs* not anastomosed with $Sc+R_1$ (Pyralini), or *Rs* anastomosed with $Sc+R_1$ (Endotrichini); median vein non-pectinated. According to the current definition of the Endotrichini, *Vitessidia* keys to this tribe, whereas *Cosmethella* and *Vitessa* key to the Pyralini. Certain features of the ♂ genitalia in *Vitessidia* appear to be endotrichine in character: the uncus is wide and flattened dorsoventrally, and distally bilobed in this genus, whereas in typical Pyralini, including *Cosmethella* and *Vitessa*, the uncus is single; the gnathos in *Vitessidia* has anteroventrally directed lateral arms and a strongly bifid medial element, as opposed to the transverse lateral arms and single, laterally compressed, blade-like medial element in *Cosmethella* and *Vitessa*. *Vitessidia*, however, differs from known Endotrichini, as well as from *Cosmethella* and *Vitessa*, in the following features: the eyes bear interfacetal hairs, a very unusual character in the Pyralidae; and R_5 separates from R_4 distal to the separation of R_3, not basal to it as in Endotrichini and many Pyralini. In external features and in ♂ and ♀ genitalia, *Vitessidia* is not, however, closely related to any Endotrichini known to us at present, and we cannot place it in this tribe with any certainty. The genera *Cosmethella* and *Vitessa*, though typical of the Pyralini in most characteristics, have wing markings that are quite distinct from those of any other genera, and at present their generic relationship is uncertain. Because *Vitessidia* has been associated with *Vitessa* (including *Cosmethella*) in the generally accepted classification, and because their relationship has not previously been questioned, we think it useful to consider the genus in the present paper.

The life-history of this group is known through the work of T. R. Bell, who made manuscript notes on one species of *Vitessa*, and preserved larval and pupal exuviae. These are discussed under the genus *Vitessa* (p. 262) and under *Vitessa suradeva rama* (p. 322).

Geographically the genera extend to North India and Sri Lanka in the west, to Queensland, Australia, in the south, and to Fiji and Samoa in the east. All three genera occur in New Guinea; *Vitessidia* appears to be confined to that island. *Cosmethella* is represented also in the Solomon Islands; *Vitessa* occupies the whole range of the group but the largest concentration of species and species-groups is in the Papuan region. This pattern of distribution is consistent either with evolution in and radiation from a Papuan centre, or with radiation from an Asiatic centre, with outward displacement and secondary local radiation of successive ancestral stocks. The latter alternative would agree with the interpretation of Belkin (1962) for mosquitoes and the model of Wilson (1959) based on ants. The distribution of *Vitessa* is discussed in greater detail under the generic heading.

The colour patterns in these genera are striking and depart widely from those normal in the Pyralinae. The nature of the patterns and their boldness suggest that they may be mimetic or aposematic. There is indirect evidence that aposematism, Müllerian mimicry and Batesian mimicry may all occur among the genera considered. The hypothesis of mimicry is supported by the convergent resemblance of the moths to members of several different groups of Lepidoptera and other insects, some of them potential or possible models.

Considering first the genus *Vitessidia*, the resemblance is to ithomiine butterflies of the genus *Tellervo* Kirby (see Vane-Wright, 1971), with which other Lepidoptera of several families constitute a mimetic association, probably partly Müllerian, partly Batesian. The relative rarity of the two *Vitessidia* species as compared with the more abundant *Tellervo* butterflies suggests that the former may be Batesian mimics of the latter.

We have not investigated in detail the possible mimetic associates or models of *Cosmethella* species. The two rare New Guinea species are *Vitessa*-like in fore wing pattern and probably belong to the same mimetic groupings as members of that genus. The more common *Cosmethella unipectinalis*, from the Solomon Islands, is reminiscent of certain Homoptera, but the similarity has not been assessed under field conditions.

Vitessa species very closely resemble such Agaristidae as *Argyrolepidia megisto* (Boisduval) and its relatives. Certain Agaristidae are thought to be aposematic models in Africa (Guillaumin, 1976), but so far as we know this has not been demonstrated for *Argyrolepidia*. Munroe and Holland collected *Argyrolepidia* species in New Guinea at mercury-vapour light, but in a ratio

of abundance of only 1 : 100 to the similarly coloured *Vitessa* species. However, many Agaristidae are mainly diurnal, and this may well be true of *Argyrolepidia*. At least some *Vitessa* species are also diurnal in part. In India, T. R. Bell (manuscript notes in BMNH) recorded *V. suradeva rama* as flying in small numbers in the daytime at flowers of *Acanthocephalus indicus* Achille Richard (Myrsinaceae) in company with larger numbers of the hypsid moth *Macrobrochis gigas* Walker, which has only a very general resemblance to this *Vitessa*. Any mimetic association between these two species is presumably only of partial efficiency. Any advantages that arise from these resemblances between *Vitessa* species and Agaristidae most likely depend on selection by diurnal, visually searching predators. Such selection might be exercised as easily on resting moths as on active ones.

A number of other moths resemble *Vitessa* species and probably enter the same mimetic associations. *Tyspanodes hillalis* (Schaus), *celebensis* Munroe and *radiata* Kenrick, and *Nevrina procopia* (Stoll) (Pyralidae : Pyraustinae) bear some resemblance to *Vitessa* species. *Heortia polyplagalis* Hampson and *dominalis* Lederer (Pyralidae : Odontiinae; see Munroe, 1977) closely resemble species of the *Vitessa zemire-* and *griseata*-groups, whilst *Heortia vitessoides* (Moore) and *H. iridia* Munroe resemble species of *Vitessa* that have black and white hind wings. *Imma saturata* (Walker) (Immidae) resembles *Vitessa cyanea*.

As well as resembling other moths, *Vitessa* species have a general appearance much like that of some lycid beetles. This group is generally considered to be aposematic, and its species are thought to be mimicked by a number of other insects. However, Drs Henry F. Howden, P. J. Darlington Jr and J. Linsley Gressitt, all of whom are familiar with the Papuan beetle fauna, were unable to suggest likely beetle models in that geographical region.

We think it possible in view of their relative abundance, rather slow flight and somewhat leathery texture that *Vitessa* species are aposematic and that they may act as models or Müllerian co-mimics rather than as Batesian mimics. Snellen (1890 : 560) mentions a ♂ of *Vitessa suradeva* from the Naga Hills with a label stating that the anal tuft had a scent of bitter almonds. We have not located this specimen. Much stronger corroborative evidence will, of course, be required before we can firmly conclude that *Vitessa* species are aposematic.

Throughout the text wing measurements given are double the distance from wing apex to centre of thorax. Original altitude records from data labels have been converted from feet to metres and rounded to the nearest 50 metres except in the cases of very low altitudes.

Abbreviations of museums, institutions and collections

ANIC	Australian National Insect Collection, C.S.I.R.O., Canberra, Australia.
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.
BMNH	British Museum (Natural History), London, U.K.
CAS	California Academy of Sciences, San Francisco, California, U.S.A.
CNC	Canadian National Collection, Biosystematics Research Institute, Agriculture Canada, Ottawa, Canada.
CM	Carnegie Museum, Pittsburgh, Pennsylvania, U.S.A.
CMAG	City Museum & Art Gallery, Birmingham, U.K.
CU	Cornell University, Ithaca, New York, U.S.A.
HI	Private collection of H. Inoue, Iruma City, Saitama Prefecture, Japan.
KRS	Koronivia Research Station, Nausori, Fiji.
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.
MM	Manchester Museum, Manchester, U.K.
MNHN	Muséum National d'Histoire Naturelle, Paris, France.
NMNH	National Museum of Natural History, Washington, D.C., U.S.A.
NMNZ	National Museum of New Zealand, Wellington, N.Z.
RNH	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.
RSM	Royal Scottish Museum, Edinburgh, U.K.
TM	Transvaal Museum, Pretoria, South Africa.
UM	Übersee-Museum, Bremen, West Germany.
UM	University Museum, Oxford, U.K.
ZM	Zoologisk Museum, Copenhagen, Denmark.

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We are indebted to our colleagues in Ottawa and London for their comments and advice.

Species transferred from *Vitessa*

Vitessa pyraliformis Walker, 1864 : 220 (Oxford Type no. 546; UM, Oxford) [examined], not *Vitessa pyraliata* Walker, 1864 : 220, though so misinterpreted by Ragonot (1891 : 646). Transferred to the family Agaristidae by Swinhoe (1892 : 159); now regarded as a synonym of *Argyrolepidia megisto* Boisduval, 1832.

Vitessa triplaga Walker, 1869 : 8 (holotype ♂ in BMNH) [examined]. Transferred to the subfamily Pyraustinae as a synonym of *Heortia dominalis* Lederer, 1863, by Hampson (1898 : 751). Later transferred to the subfamily Odontiinae by Munroe (1977 : 436).

Check-list of genera, species-groups, species and subspecies

VITESSIDIA Rothschild & Jordan, 1905
- ***diaphana*** Rothschild & Jordan, 1905
- ***geometrina*** **sp. n.**

COSMETHELLA **gen. n.**
- ***unipectinalis*** (Hampson, 1906) **comb. n.**
- ***minor*** **sp. n.**
- ***major*** **sp. n.**

VITESSA Moore, [1860]
- *Cosmethis* sensu auct. nec Hübner, [1820]

griseata-group
- ***griseata*** Kenrick, 1907
- ***brandti*** **sp. n.**
- ***talboti*** (Janse, 1924) **comb. n.**
- ***nobilis*** **sp. n.**

zemire-group
- ***cyanea ceramensis*** **subsp. n.**
- ***cyanea cyanea*** Hampson, 1906

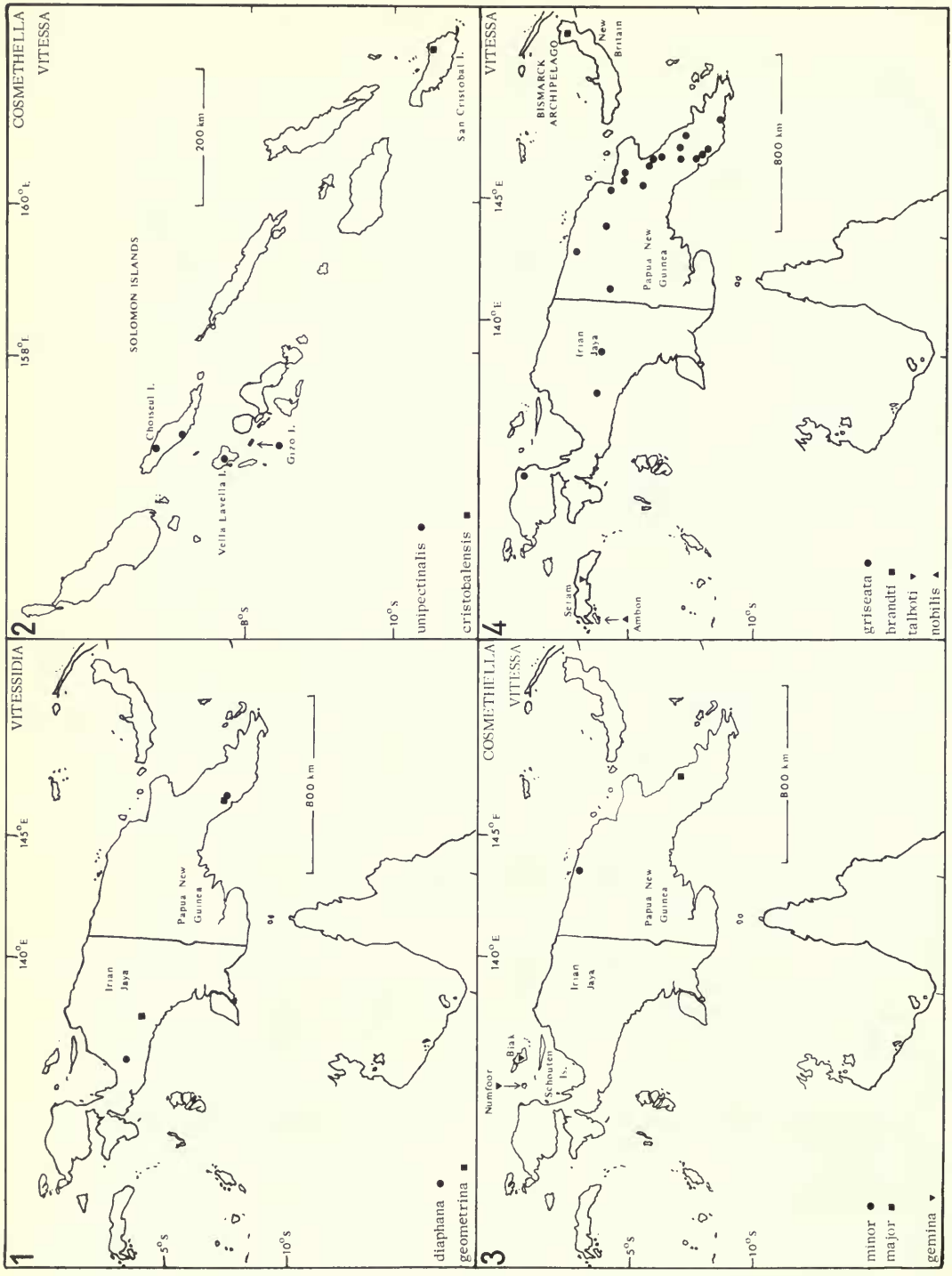
***zemire expansa* subsp. n.**
zemire zemire (Stoll, 1782)
zemire temerata Swinhoe, 1906 **stat. n.**
***zemire nephritica* subsp. n.**
***zemire coronis* subsp. n.**
***zemire novaebritanniae* subsp. n.**
***zemire solomonis* subsp. n.**
***zemire cheesmanae* subsp. n.**
vitialis Hampson, 1906
***tamsi* sp. n.**
hieratica-group
hieratica Swinhoe, 1900
stettina-group
***philippina* sp. n.**
stettina Swinhoe, 1906
***hollandi wallacealis* subsp. n.**
***hollandi hollandi* subsp. n.**
hemiallactis-group
ternatica Lederer, 1863
sarumensis Holland, 1900 **syn. n.**
***hemiallactis moluccana* subsp. n.**
hemiallactis hemiallactis Meyrick, 1887
***hemiallactis admiralitatis* subsp. n.**
***hemiallactis lustrans* subsp. n.**
***intermedia* sp. n.**
***barretti* sp. n.**
glaucoptera Hampson, 1906
***cristobalensis* sp. n.**
pyraliata-group
nicobarica Hampson, 1896
***pyraliata latialbata* subsp. n.**
***pyraliata triangulifera* subsp. n.**
pyraliata pyraliata Walker, 1864
***kolakalis* sp. n.**
***sulaensis* sp. n.**
***muluana* sp. n.**
***gemina* sp. n.**
splendida Schultze, 1908
plumosa-group
plumosa plumosa Hampson, 1896
***plumosa salayerensis* subsp. n.**
suradeva-group
teleroma Swinhoe, 1906
suradeva suradeva Moore, [1860]
formosa Felder & Rogenhofer, 1874
suradeva rama Moore, 1885 **stat. n.**

Key to genera

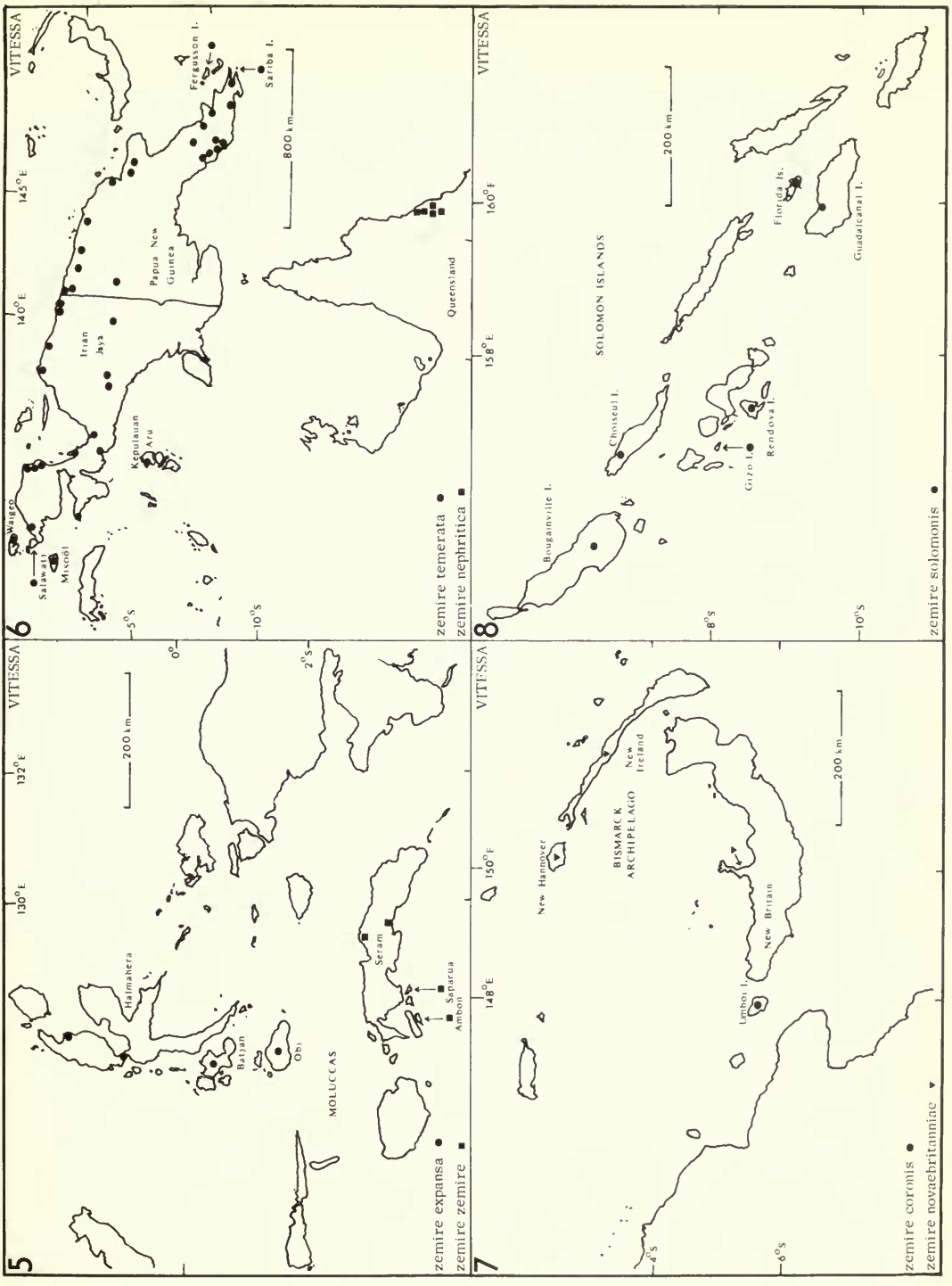
1 Antenna simple, either ciliated or pilose, weakly compressed, its length more than three-quarters that of fore wing; fore wing with discocellular vein at centre strongly angled toward base . . . . . ***VITESSIDIA*** (p. 245)
– Antenna laminate, unipectinate or bipectinate, its length less than three-quarters that of fore wing; fore wing with discocellular vein at centre not strongly angled toward base . . 2
2 Antenna unipectinate in both sexes; fore wing with R_2 stalked with R_{3+5} ***COSMETHELLA*** (p. 254)
– Antenna bipectinate in ♂, laminate in ♀; fore wing with R_2 arising from cell ***VITESSA*** (p. 258)

VITESSIDIA Rothschild & Jordan, 1905

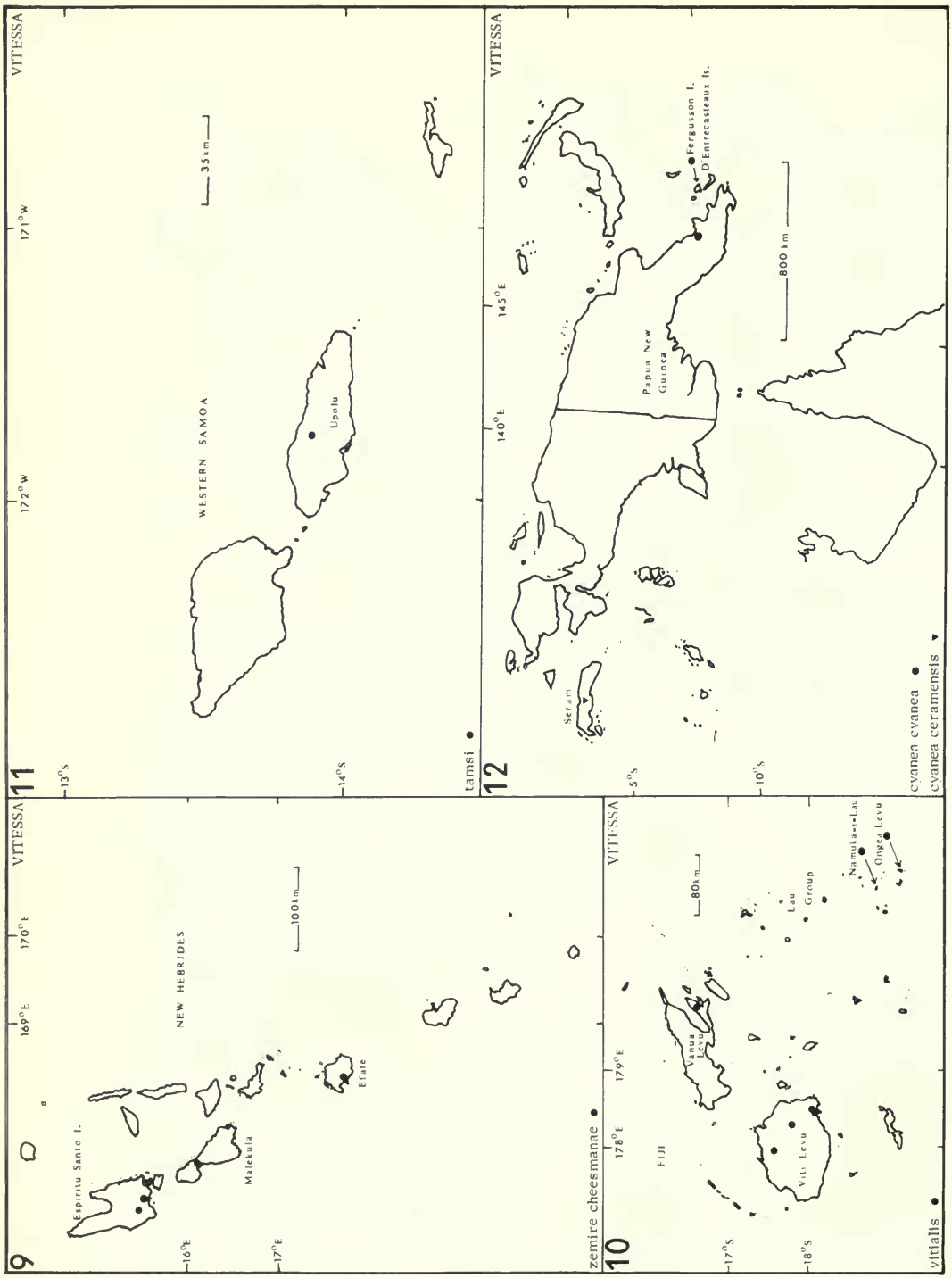
Vitessidia Rothschild & Jordan, 1905, *Novit. zool.* **12** : 475. Type-species: *Vitessidia diaphana* Rothschild & Jordan, 1905, by original designation and monotypy.



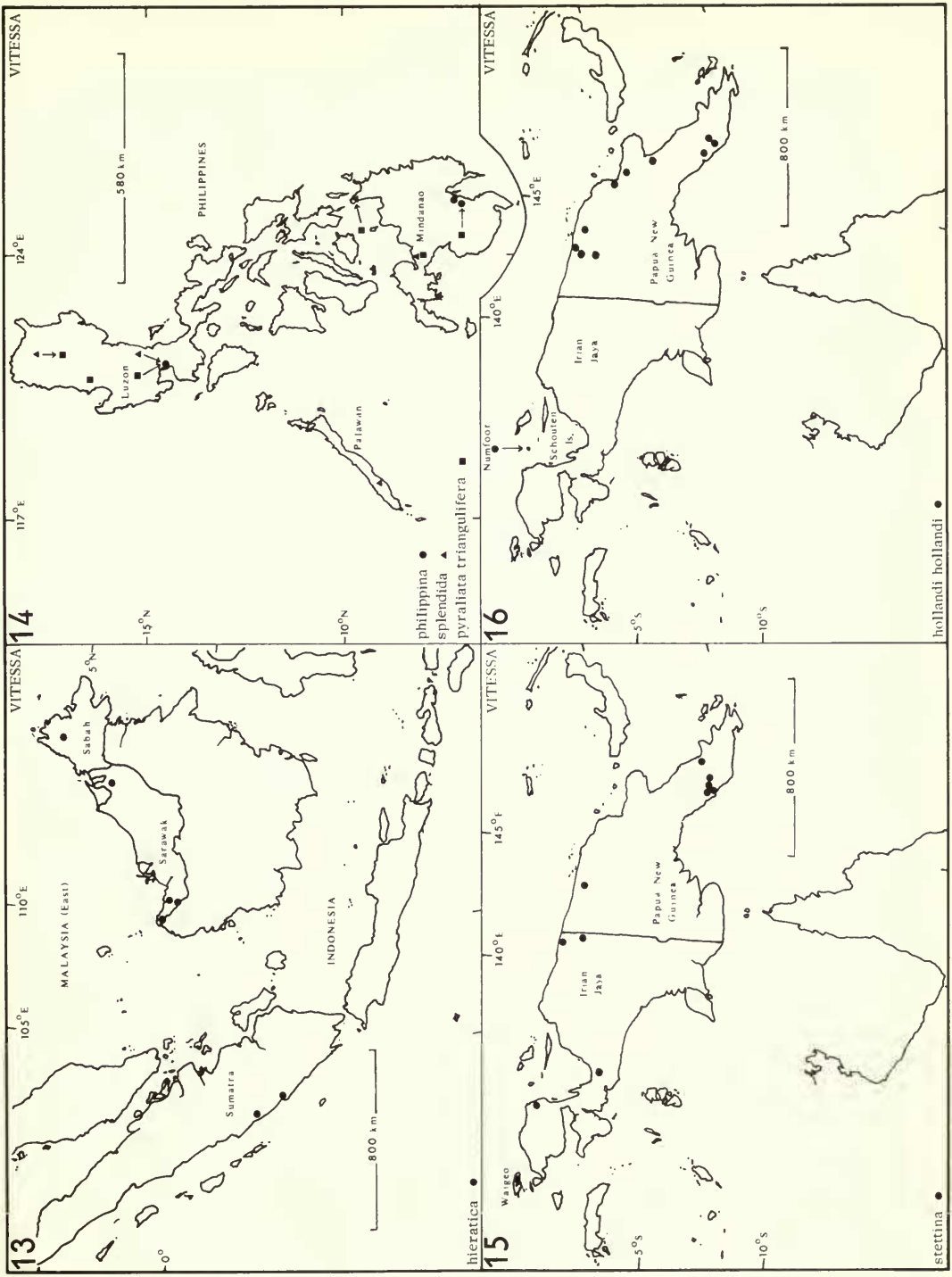
Figs 1-4 Distribution maps.



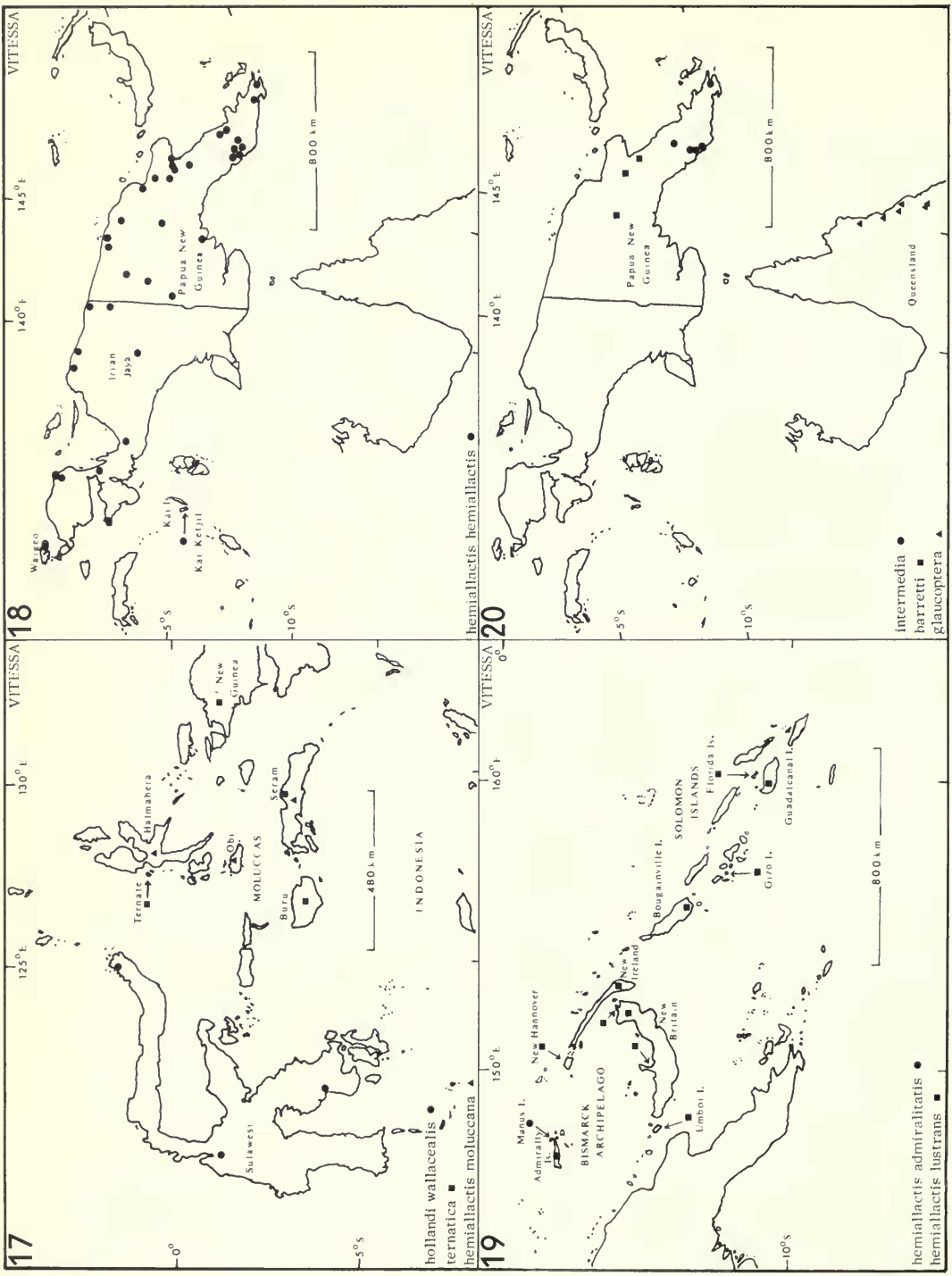
Figs 5-8 Distribution maps.



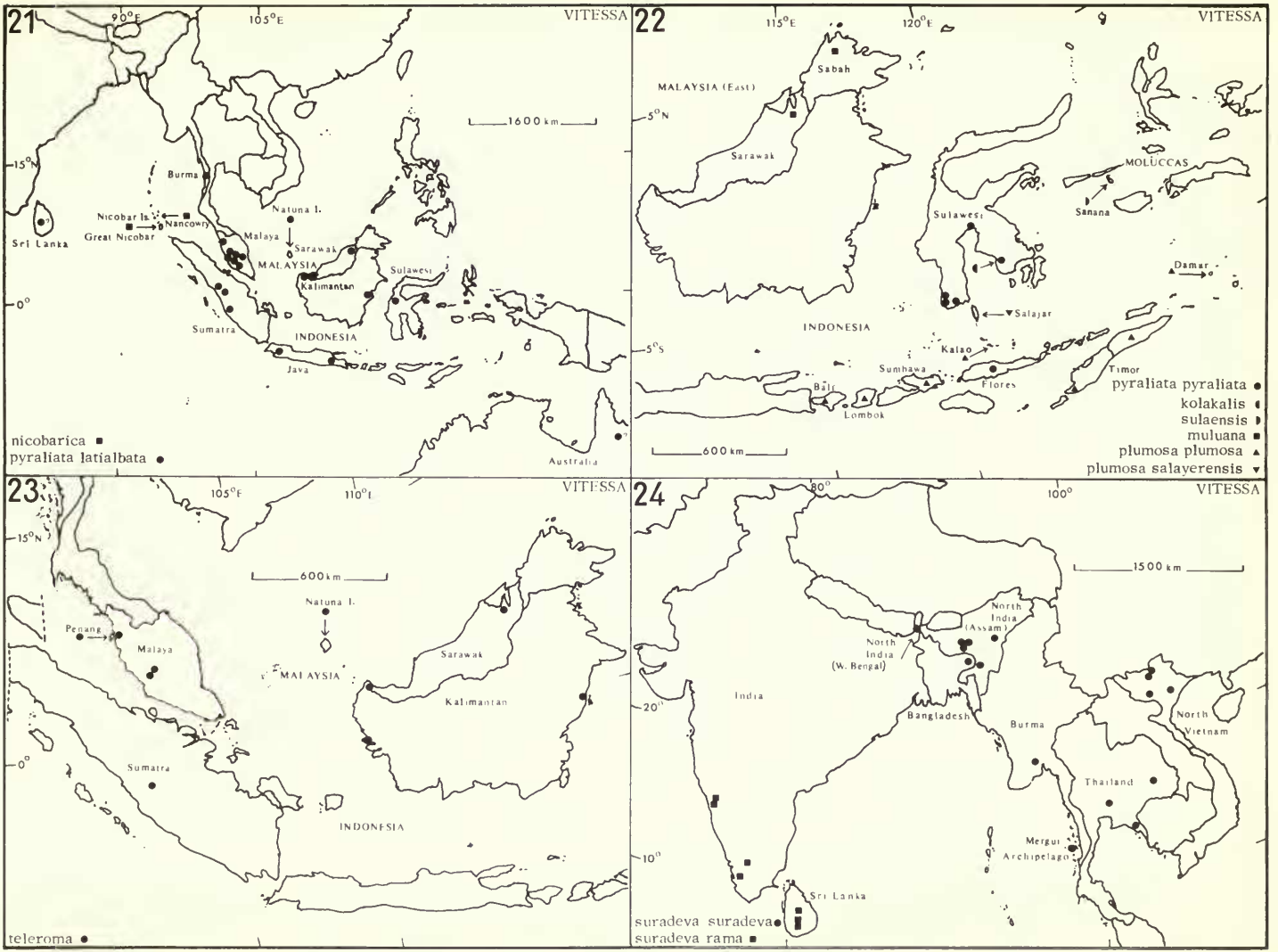
Figs 9-12 Distribution maps.



Figs 13-16 Distribution maps.



Figs 17-20 Distribution maps.



Figs 21-24 Distribution maps.

Head small. Frons rounded, shaggily or smoothly scaled, anteriorly directed plume of scales between antennae. Vertex short, scaling erect, woolly. Eye well developed, with long interfacetal hairs over central area. Ocellus large, conspicuous. Chaetosema elliptical, directed laterally, with long radiating setae. Antenna nearly as long as fore wing; thick, compressed, heavily ciliated in ♂; evenly short-pilose in ♀. Labial palpus in ♂ prominent, curved, upturned; first segment short, weakly curved; second segment thick, long, strongly curved, extending well above vertex, distally expanded, obliquely truncate; third segment acuminate, obliquely ascending from a subterminal origin on anterior surface of second segment. Labial palpus in ♀ shorter, obliquely ascending; first segment as in ♂; second segment slender, nearly straight, reaching about level of vertex; third segment straight, acuminate, continuing line of second. Maxillary palpus minute, directed medially toward base of proboscis. Proboscis long, strong, scaled at base. Neck region with slender erect scales. Body slender; abdomen long, exceeding hind wing. Legs long, slender; outer spurs shorter than inner; tarsi with long ventral spines. Fore wing in ♂ broad; costa nearly straight; apex rounded; termen curved, oblique; tornus angled; posterior margin nearly straight, narrowly curved at base. Wing in ♀ broader, costa convex, apex and termen more rounded. Costal area wide. Cell about half length of wing. Discocellular vein strongly angled at middle. *Sc* approaching or anastomosing with R_1 postmedially. R_1 from before apex of cell, approaching or anastomosing with R_2. R_3 stalked with R_{4+5}. R_4, R_5 long-stalked. M_1 stalked for a short distance with R_{3+5}. M_2, M_3 stalked from posterior angle of cell. Cu_1 from just behind posterior angle. Cu_2 from cell at middle. *CuP* preserved near wing-base and termen. A_1 straight. A_2 forming a small loop and spur with A_1. Hind wing broad; apex, termen, anal angle rounded. Costal area wide. Cell about half length of wing. Discocellular vein anteriorly straight, erect; at middle obtusely angled, with a distinct medial spur extending toward base; posterior part straight, oblique distad. $Sc+R_1$ anastomosed for most of postcellular length with *Rs*. M_1 basally apposed to or stalked with *Rs*. M_2 and M_3 stalked from posterior angle of cell. Cu_1 from behind posterior angle. Cu_2 from cell at middle. *CuP* and two anals present. Frenulum of ♀ with two long setae.

Genitalia ♂ (Fig. 135). Uncus wide, deeply bifid, each process trumpet-shaped, with shaggy dorsal scales. Gnathos wide; lateral arms broad, dorsoventrally flattened, anteroventrally directed; medial element formed of paired claw-like, admedial, posterior processes, arising from a transverse band. Transtilla with broad triangular lateral elements, joined by a weak semimembranous medial section. Tegumen wide, arched; sclerotization narrowly stronger at origin of gnathos. Vinculum broad and rounded. Valve with broad rounded distal expansion; costa sigmoidal; a strengthening ridge, obsolescent distally; narrowly inflated and sclerotized, with small triangular expansion dorsally at tip. Juxta ovate, lightly sclerotized, with large V-shaped posteromedial emargination; on dorsal surface of anellus a posteriorly pointed V-shaped catena, with strong medial ridge. Aedeagus long, narrow and sinuate, basally rounded; junction of ductus ejaculatorius subbasal; manica without spines; vesica minutely spinose. Cornuti small, few and isolated, possibly deciduous.

Genitalia ♀ (Figs 219–222). Ovipositor lobes low, cushion-like, dorsally rounded and separated. Setae short, longer on outer margin, all simple. Posterior apophysis short, with a symmetrical vertical bar. Anterior apophysis slightly longer, stronger, distally tapering, weakly bent near base. Eighth sternite triangular, deeply indented anteriorly, sides elongated and acuminate. Eighth tergite rectangular, ventrolaterally rounded, covered with setae. Ostial chamber small, unarmed. Ductus bursae long, slender, membranous; base with a pair of lateral sclerites extending to junction of ductus seminalis. Corpus bursae oval or comma-shaped, finely denticulate posteriorly, with weakly sclerotized signum.

Remarks. This genus is known from two species, both from the central mountain ranges of New Guinea. We have no record of the habits, but the pattern suggests that the moths are diurnal. The genus differs from *Cosmethella* and *Vitessa* in a number of striking external and genital characters (see notes in Introduction), though there is a similarity in the structure of the labial palpi. In *Vitessidia*, however, they are longer in the ♂ than the ♀, whereas in *Cosmethella* they are longer in the ♀, and in *Vitessa* of the same length in both sexes. In the ♂ genitalia the anellus lacks lateral and medial spines, and is not reflexed after eversion; the ventral junction of the vesica to the aedeagus is plain, not rugose, hence the vesica is not reflexed after eversion. In this respect *Vitessidia* is similar to *Cosmethella*, but differs from *Vitessa*. In the ♀ genitalia the ovipositor lobes have simple setae, as in *Cosmethella*, unlike *Vitessa* where the ovipositor bears flattened spiny setae in addition to simple setae.

Biology. Early stages and host-plants unknown. Moths taken by various collectors from January to April and September to December.

DISTRIBUTION (Fig. 1). New Guinea: Irian Jaya; Papua New Guinea.

Key to the species of *Vitessidia*

1 Fore wing upperside with broad proximal and narrow curved preapical, translucent white areas; veins on white areas of upperside of fore and hind wings narrowly black . . ***diaphana*** (p. 253)

– Fore wing upperside with irregularly ovoidal distal translucent white area; veins on white areas of fore and hind wings whitish buff, with little trace of infuscation . . . ***geometrina*** (p. 253)

Vitessidia diaphana Rothschild & Jordan, 1905
(Figs 1, 45, 46, 135, 219, 221)

Vitessidia diaphana Rothschild & Jordan, 1905, *Novit. zool.* **12** : 475. Holotype ♂, NEW GUINEA: Papua, Angabunga R., affl[uent] of St Joseph R., 1850 m ('6000 ft') upwards, xi.1904–ii.1905 (*Meek*) (genitalia slide no. 1503; BMNH) [examined].

Vitessidia diaphana Rothschild & Jordan; Janse, 1928 : 88.

♂, ♀. 47–56 mm. Frons shaggily scaled; in ♂ white, laterally bordered with black; in ♀ black, admixed and laterally bordered with white. Plume of scales between antennae white; in ♀ smaller, with less white. Vertex black. Eye black with pale interfacetal hairs. Ocellus buff, shiny. Chaetosema with pale yellowish setae. Antenna black. Labial palpus black; weak pale grey scaling on dorsal surfaces of second and third segments in ♂; pale grey scaling absent in ♀; ventral surfaces of first and second segments lightly admixed with white. Maxillary palpus buff-tinted. Basal scaling of proboscis black, minutely admixed with white at base in ♂, with more white in ♀. Neck region with black and orange scaling. Thorax above: blackish fuscous; patagium and tegula orange, scales black-tipped. Abdomen above: black, terminal segments orange. Body below and legs black; pectus, fore coxa, parts of mesal surfaces of all femora, and terminal abdominal segments orange. Fore wing above: ground colour, including fringe, black, with weak violaceous reflections. An irregularly quadrate, nacreous, translucent white area occupying much of proximal half of wing. A similarly coloured curved preapical area from cell at R_5 to cell at M_3. Both areas intersected by narrow black vein-lines. Hind wing above: ground colour as on fore wing. A large ovate, nacreous, translucent white subbasal and discal area, intersected by black vein-lines, narrower than those of fore wing. Underside of fore and hind wings like upperside but less violaceous; retinaculum of fore wing glossy dark grey.

GENITALIA ♂ (Fig. 135). As described for genus.

GENITALIA ♀ (Figs 219, 221). In general as described for genus. Posterior apophysis slightly curved and tapering. Anterior apophysis evenly curved and weakly sinuate, tapering and finely acuminate. Ostial chamber weakly sclerotized, posterior opening wide, narrowing sharply anteriorly; proximal part of ductus bursae about six times as long as wide, paired sclerites long, narrow, strong. Corpus bursae oval; signum on posterior lobe near entrance to ductus bursae, a weakly sclerotized incurved plate, finely denticulated.

REMARKS. The wing markings, though similar to those of *V. geometrina*, are quite distinct. In the ♀ genitalia the apophyses are shorter and thicker; both the whole ductus bursae and its proximal parts and sclerites are longer. The corpus bursae is oval, not comma-shaped, and the signum is smaller and simpler.

BIOLOGY. Early stages and host-plant unknown. Moths collected in January to November.

DISTRIBUTION (Fig. 1). New Guinea: Irian Jaya; Papua New Guinea.

MATERIAL EXAMINED

New Guinea: 6 ♂, 8 ♀, Irian Jaya, Weyland Mts, Menoo Valley, Mt Kunupi, 1850 m, xi.1920–i. 1921 (*C., F. & J. Pratt*) (BMNH; TM, Pretoria). In addition, Dr Vári examined 19 ♂, 11 ♀ not seen by us (TM, Pretoria).

Vitessidia geometrina sp. n.
(Figs 1, 47, 220, 222)

♂. Unknown.

♀. 44–48 mm. Frons smoothly scaled, black, laterally bordered with white. Plume of scales between antennae black with violaceous reflections; vertex of same colour, smoothly scaled; a small yellow tuft

behind antenna. Eye, ocellus, chaetosema as in *V. diaphana*. Antenna black, scape with slight admixture of white on inner surface. Labial palpus black, ventral surface of first and base of second segment admixed with white. Maxillary palpus buff-tinted. Basal scaling of proboscis black, admixed with white at extreme base. Neck region with black-based yellow scales. Body above, including patagium and tegula: black with violaceous reflections; border of anterior portion of terminal abdominal segment yellow. Thorax below and legs black; pectus, parts of fore and mid coxae yellow admixed with white; ventral surfaces of mid and hind femora white. Abdomen below: black, posterior margins of segments broadly white admixed with yellow, continuing narrowly on lateral surfaces to height of spiracles; terminal segment completely yellow. Fore wing: ground colour above, including fringe, black, with weak violaceous reflections. An irregularly ovoidal, nacreous, translucent white area on distal part of wing. Hind wing above: ground colour as on fore wing. A large, ovate, nacreous, translucent, white subbasal and discal area extending broadly to anal margin, showing whitish buff veins with slight infuscation; vein-lines of same thickness as in fore wing. Underside of fore and hind wings like upperside but less violaceous; on fore wing white admixture from base, spreading along anal margin and lightly up the termen; retinaculum glossy light grey; on hind wing white at base spreading along base of costa.

Genitalia ♀ (Figs 220, 222). In general as described for genus. Posterior apophysis slightly curved and tapering. Anterior apophysis evenly curved and weakly sinuate, noticeably widened for first third of length, distally tapering, small central swelling at beginning of last third, tip blunt. Ostial chamber weakly sclerotized, posterior opening narrow, leading abruptly to ductus bursae. The latter shorter than in *V. diaphana*, its proximal part two to three times as long as wide, the paired sclerites relatively short. Corpus bursae distinctly comma-shaped; signum weak, elongate, nearly half as long as corpus, extending basad from junction of ductus bursae, forming deep, curved indentation along side of corpus, with evenly spaced, rib-like ripples at right-angles to margin along entire length. Opposite margin of corpus bursae finely denticulated.

Remarks. The moths are smaller than in *V. diaphana* and have several distinctive external and genital characters. The ground colour of the fore and hind wings is lighter than *V. diaphana*. The white part of the fore wing is reduced to one patch. The white areas in this species are less nacreous.

Biology. Early stages and host-plant unknown. Moths collected in January to April, September to December.

Distribution (Fig. 1). New Guinea: Irian Jaya; Papua New Guinea.

Material examined

Holotype ♀, **New Guinea:** Papua, Upp[er] Aroa R., i–iv. 1903 (*Meek*) (BMNH).

Paratypes. **New Guinea:** 2 ♀, Irian Jaya, Snow Mts, nr Oetakwa R., up to 1050 m ('3500 ft'), x–xii.1910 (*Meek*) (genitalia slide no.'s 1504, 15282; BMNH); 1 ♀, I. J., Snow Mts, Upper Setekwa R., 600–900 m ('2000–3000 ft'), ix.1910 (*Meek*) (genitalia slide no. 14675; BMNH); 1 ♀, I. J., Araucaria Camp, 800 m, iii. 1939 (*Toxopeus*) (RNH, Leiden).

COSMETHELLA gen. n.

Gender: feminine

Type-species: *Vitessa unipectinalis* Hampson.

Head small. Frons rounded, narrow, smoothly scaled. Vertex flat, somewhat elevated, with rough, forward-directed scales. Eye large. Ocellus absent. Chaetosema elliptical, close to eye, directed posterolaterally, bearing long radiating setae. Antenna about two-thirds length of wing, compressed, distinctly unipectinate in both sexes. Labial palpus in ♂ shorter than in ♀; slender, obliquely upturned; first segment short; second segment long, in ♂ reaching level of vertex, in ♀ well above vertex, third segment equal in length to second in ♂, shorter than second in ♀, acuminate and usually continuing line of second segment. Maxillary palpus short, directed medially, with distal, weakly dilated, triangular tuft of scales. Proboscis weak but coiled, scaled at base. Body slender; abdomen long, exceeding hind wings. Legs short, robust, with long strong tibial spurs, outer spurs shorter than inner; tarsi ventrally spined. Fore wing narrow; costa nearly straight, strongly curved near base; apex narrowly rounded; termen slightly curved and oblique; tornus obtuse; posterior margin slightly curved, more strongly at base. Costal area wide. Cell about half length of wing. Discocellular vein concave distad. *Sc* well separated from *R* and R_1. R_1 from

cell at two-thirds from base. R_{2+5} from apex of cell; R_2 stalked with R_{3+5}; R_5 stalked for a variable distance with R_{3+4}. M_1 from anterior angle of cell, or stalked for a very short distance with R_{2+5}; except for this stalking its base not apposed to that of R_{2+5}. M_2 and M_3 short-stalked from posterior angle of cell. Cu_1 from just behind posterior angle. Cu_2 from cell at four-fifths from base. *CuP* preserved near wing base and termen. A_1 straight. A_2 forming a small loop and spur. Hind wing narrow; apex, termen and anal angle rounded. Costal area wide. Cell about half length of wing. Discocellular vein with strong basally directed angulation before middle, posterior part distally oblique. $Sc+R_1$ not anastomosed with *Rs*. M_1 stalked with *Rs* for short distance beyond cell. M_2 and M_3 stalked from posterior angle of cell. Cu_1 from behind posterior angle. Cu_2 from cell at three-fourths from base. *CuP*, A_1 and A_2 present. Frenulum of ♀ with two long setae.

Genitalia ♂ (Fig. 136). Uncus narrow, parallel-sided, constricted at base, rounded at tip; tip and posterolateral margin with fine setae dorsally. Gnathos with curved lateral arms, meeting at mid-line in an acute angle, forming strong medial spur. Transtilla strong, complete, with dorsal arch in mid-line. Tegumen short, wide, angular, with strong shoulders. Vinculum broad, thickened ventrally, dorsally with a curved, medially directed process on each side, supporting a membranous setose area. Valve short, wide, fan-shaped; costa nearly straight, with narrow tubular thickening; terminal margin long, curved; sacculus weakly thickened, not strongly sclerotized, generally recurved, ending in a produced posteroventral angle; mesal surface densely covered with setae arranged on radiating striations. Juxta large, deeply bifurcate dorsally; each side with a long slender process, in slide preparations reaching half length of uncus; also a short, sharp, laterally directed process on each side near the curved ventral edge; anellus simple. Aedeagus short, narrow, slightly sinuate, basally rounded; ductus ejaculatorius arising mid-way; posterior end minutely spinose; vesica large, membranous, sac-like, lacking spines but with small, thin sclerotized bands at either end; cornuti absent.

Genitalia ♀ (Figs 223–225, 269–271, 315). Ovipositor lobes small, narrow, dorsally rounded and connected. Setae short, longer on outer margin, all simple (Fig. 315). Posterior apophysis long and slender, vertical bar incomplete. Anterior apophysis as long as but thicker than posterior, slightly sinuate. Eighth sternite triangular. Eighth tergite rectangular, several transverse rows of setae on posterior portion. Ostial chamber wide, with long, wide, simple, scobinated antrum in dorsal wall, extending anteriorly into a short caecum of ostial chamber. Ductus bursae short and wide. Corpus bursae large, cylindrical, more or less J-shaped; signum absent.

Remarks. This genus is known from three species, two represented only by holotypes. Though the holotype of *C. minor* was taken at light, the apparently mimetic pattern suggests that the moths are probably mainly diurnal. The genus differs from *Vitessidia* in both external and genital characters; as explained in the Introduction, the two genera are probably not closely related. The eye, unlike that of *Vitessidia*, lacks interfacetal hairs. The antenna of *Cosmethella* is unipectinate, not simple as in *Vitessidia*. The labial palpus is longer in the ♀ than in the ♂ in *Cosmethella*, the opposite in *Vitessidia*. The two genera share the relatively plain anellus, lacking spines and not reflexed after eversion. In both genera the vesica lacks the reflexing mechanism found in *Vitessa*.

Cosmethella is closely related to *Vitessa* but differs in a number of characters. The antenna is unipectinate in both sexes in *Cosmethella*, not bipectinate in the ♂ and laminate in the ♀. The labial palpus is longer in the ♂ of *Cosmethella* and much longer in the ♀, not shorter and of equal length in the sexes as in *Vitessa;* in *Cosmethella* it has the second segment straight and oblique, not curved basally. *Cosmethella* shares with *Vitessa* the prominent maxillary palpus. The cell is shorter in both fore and hind wings. R_2 of the fore wing is stalked with R_{3+5}, whereas in *Vitessa* it arises from the cell. Like *Vitessa*, this genus has $Sc+R_1$ anastomosed with *Rs*. The genitalia in both sexes differ very markedly from those of *Vitessa*, particularly in shape of valve in the ♂. In the ♀ the ovipositor lobes have simple setae; in all examined species of *Vitessa* some setae are covered with spines. There are also distinct differences in the shape of the antrum, ductus bursae and corpus bursae.

Biology. Early stages and host-plants unknown. Moths so far taken by only a few collectors from January to March and from October to December.

Distribution (Figs 2, 3). New Guinea: Papua New Guinea. Solomon Islands.

Key to the species of *Cosmethella*

1 Thorax purplish fuscous; fore wing with pale antemedial fascia about one-sixth as wide as long. Solomon Islands . . . . . ***unipectinalis*** (p. 256)
– Thorax orange-yellow with black spots; fore wing with pale antemedial fascia more than one-third as wide as long. New Guinea 2
2 Longest antennal pectinations in ♀ about three times as long as width of antennal shaft; fore wing with antemedial fascia narrowed behind, forming a semicircular patch; expanse under 30 mm . . . . . ***minor*** (p. 256)
– Longest antennal pectinations in ♀ about six times as long as width of antennal shaft; fore wing with antemedial fascia scarcely narrowed behind, meeting posterior margin broadly; expanse over 40 mm . . . . . ***major*** (p. 257)

Cosmethella unipectinalis (Hampson, 1906) **comb. n.**
(Figs 2, 48, 49, 136, 223, 269)

Vitessa unipectinalis Hampson, 1906, *Ann. Mag. nat. Hist.* (7) **17** : 217. LECTOTYPE ♂, SOLOMON ISLANDS: Gizo I. (*Meek*) (genitalia slide no. 15283; BMNH), here designated [examined].

♂, ♀. 32–38 mm. Frons, vertex orange, with darker shading laterally. Eye black. Chaetosema with setae yellow. Antenna fuscous. Labial palpus fuscous, ventral surface of second segment in ♂ light brown, tip of palpus light brown in both sexes. Maxillary palpus fuscous. Basal scaling of proboscis blue-black. Neck region orange. Thorax above: patagium, tegula and abdomen above metallic blue-black; in ♂ a slight admixture of orange in most abdominal segments; terminal segment orange. Underside of thorax and abdomen like upperside, terminal segment admixed with black. Legs metallic blue-black. Fore wing: ground colour above metallic blue-black. A narrow, oblique, white antemedial fascia, slightly curved at costal end. A white longitudinal stripe in cell R_5, a smaller white stripe above. A narrow triangular white apical patch. Fringe fuscous. Hind wing above metallic purplish fuscous, unmarked. Underside of wings purplish fuscous. On fore wing faint traces of proximal line and stripe in cell R_5; apical patch distinct.

GENITALIA ♂ (Fig. 136). As described for genus.

GENITALIA ♀ (Figs 223, 269). In general as described for genus. Apophyses nearly straight. Eighth tergite with irregularly distributed setae. Eighth sternite indented at posterior angle. Caecum slightly wider than antrum. Sides of antrum slightly curved, broadly rounded posteriorly.

REMARKS. This geographically isolated species can be distinguished by its narrow proximal fascia and smaller, distinct apical marking, also by its blue-black thorax.

BIOLOGY. Early stages and host-plant unknown. Moths collected from January to March and in November and December.

DISTRIBUTION (Fig. 2). Solomon Islands.

MATERIAL EXAMINED

Paralectotype. 1 ♂, data as lectotype (abdomen missing; BMNH).

Solomon Islands: 4 ♂, north side of Choiseul I., xii.1903 (*Meek*) (BMNH); 3 ♂, south side of Choiseul I., i.1904 (*Meek*) (BMNH); 1 ♂, 1 ♀, Vella Lavella I., ii. and iii. 1908 (*Meek*) (BMNH); 9 ♂, 4 ♀, Gizo I., 1903 and xi.1903 (*Meek*) (BMNH; NMNH, Washington).

Cosmethella minor **sp. n.**
(Figs 3, 50, 224, 270, 315)

♂. Unknown.

♀. 28 mm. Frons, vertex orange. Eye fuscous. Chaetosema setae yellow. Antenna black. Labial palpus black, some orange scaling basally and distally. Maxillary palpus basally black, distally orange. Basal scaling of proboscis black. Neck region orange. Thorax above: tegula orange, with an anterior black spot. Abdomen above: metallic blue-black, terminal segment orange. Thorax and abdomen below: blue-black, terminal segment orange. Legs blue-black, grey-banded. Fore wing above: ground colour black with purplish reflections. A small orange basal spot on *Cu*. A narrow, erect, diffuse, white subbasal fascia. A large, white, nearly semicircular antemedial fascia, not reaching costa or posterior margin. Discocellular vein and longitudinal veins in terminal half of wing outlined in whitish grey. A creamy apical patch

diffusing into the vein-lines. Fringe fuscous. Hind wing and fringe with purple reflections, unmarked. Fore wing below: fuscous, shading to pale grey on posterior margin. A large, posteriorly narrowing, white subterminal fascia, narrowly outlined with black anteriorly and distally. Underside of hind wing similar to upperside.

GENITALIA ♀ (Figs 224, 270, 315). In general as described for genus. Posterior apophysis slender and nearly straight. Anterior apophysis curved. Eighth sternite a nearly equilateral triangle. Caecum short and weak.

REMARKS. This species is distinct from *C. unipectinalis* in fore wing markings and colour of thorax (see key). The ♀ genitalia differ from those of *C. unipectinalis* in the long ovipositor lobes, curved posterior apophysis, more anteriorly concentrated setae of eighth tergite, shorter caecum, and broader antrum, with posterior end angled medially rather than round. *C. minor* resembles *C. major* in general appearance, but differs in the shorter antennal pectinations and in the markings of the fore wing, as follows: the proximal fascia of the upperside is posteriorly constricted in the present species and the pale apical patch of the upperside is narrow; on the underside the subterminal pale fascia is posteriorly elongate. The eighth sternite forms a nearly equilateral triangle rather than a wider, truncated one as in *C. major*. The fore wing markings bear a slight resemblance to those of *Vitessa cyanea*, enhanced by the uniformly dark hind wing; in all other aspects the two species are quite distinct.

BIOLOGY. Early stages and host-plant unknown. Holotype collected in October at mercury-vapour light.

DISTRIBUTION (Fig. 3). New Guinea: Papua New Guinea.

MATERIAL EXAMINED

Holotype ♀, **New Guinea:** North-east New Guinea, Wewak, Dagua Road, near sea level, 21.x.1957, at mercury-vapour light (*Munroe & Holland*) (genitalia slide no. DK 107; CNC, Ottawa; type no. 11,012).

Cosmethella major sp. n.

(Figs 3, 51, 225, 271)

♂. Unknown.

♀. 42 mm. Frons orange. Vertex orange, posteriorly yellow. Eye fuscous. Chaetosema setae yellow. Antenna fuscous. Labial palpus fuscous; orange scaling on ventral surface of second segment; tip of palpus light brown. Maxillary palpus fuscous, orange-tipped. Basal scaling of proboscis black. Neck region orange. Thorax above: patagium and tegula orange, each with a black anterior spot. Abdomen black above, terminal segment orange. Thorax, abdomen below: black; a thin band of orange on pectus; terminal segment orange. Legs black, grey-banded. Fore wing above: ground colour black with faint purplish lustre; a small orange basal spot on *Cu*; a narrow, arcuate, creamy white subbasal fascia. Antemedial fascia broad, weakly oblique medially, creamy white; commencing narrowly behind costa, rapidly widening and extending broadly to posterior margin. A creamy spot on discocellular vein near posterior angle of cell. Longitudinal veins in terminal half of wing outlined in creamy yellow. A fairly wide, triangular, creamy yellow subapical patch, bordered by a narrow black marginal line. Fringe fuscous. Hind wing and fringe black with purple reflections, unmarked. Fore wing below: fuscous with purple reflections; subapical patch as on upperside; a diffuse, pale proximal area and pale posterior margin. Hind wing below as on upperside.

GENITALIA ♀ (Figs 225, 271). In general as described for genus. Posterior apophysis weakly sinuate. Anterior apophysis angled near base. Eighth tergite with one irregular, major, transverse, posterior row of setae, numerous setae scattered over remaining area. Eighth sternite subtriangular, wider than long, posteriorly truncated. Sclerotized antrum with narrow diverticulum and long subacute process.

REMARKS. This species resembles *C. minor*; differential characters are noted under that species. The development of the antrum is the most distinctive genital character.

BIOLOGY. Early stages and host-plant unknown. Holotype collected in March.

DISTRIBUTION (Fig. 3). New Guinea: Papua New Guinea.

MATERIAL EXAMINED

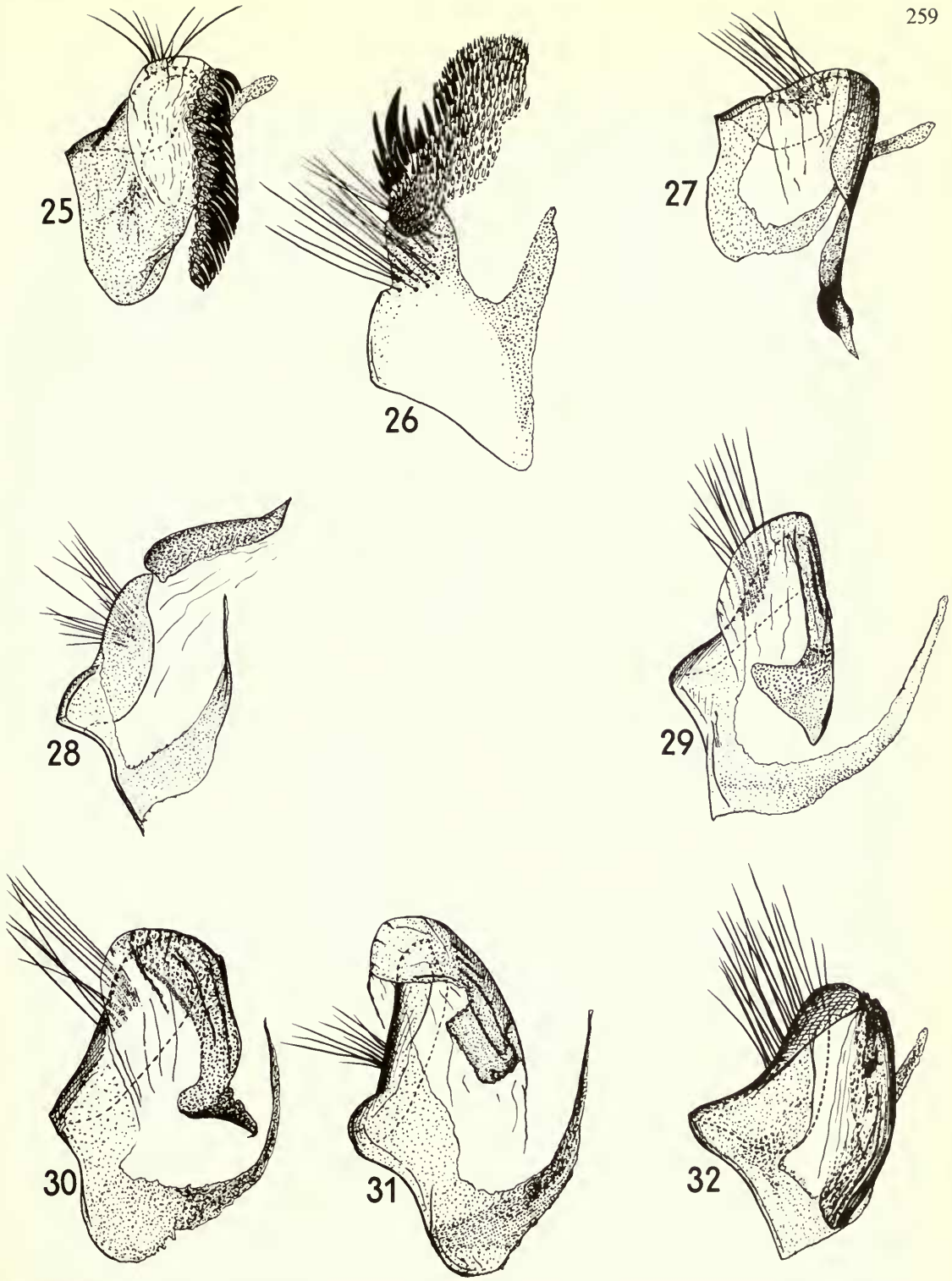
Holotype ♀, **New Guinea:** Mambare R., Biagi, 1500 m ('5000 ft'), iii.1906 (*Meek*) (genitalia slide no. 14698, BMNH).

VITESSA Moore, [1860]

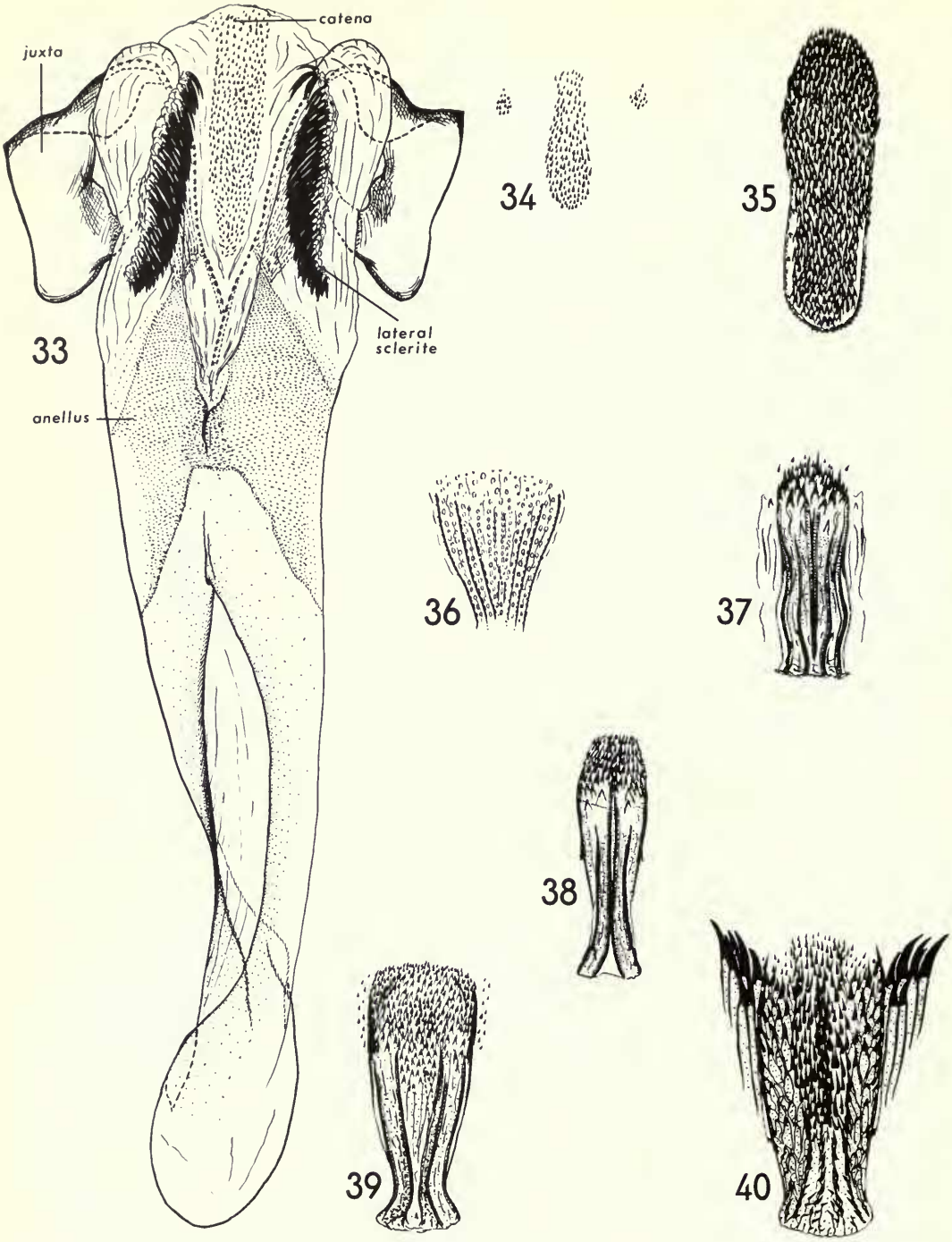
Vitessa Moore, [1860,] *in* Horsfield & Moore, *Cat. lepid. Insects Mus. nat. Hist. East-India House* **2** : 299.
Type-species: *Vitessa suradeva* Moore, [1860], by original designation and monotypy.
[*Cosmethis* Hübner; sensu de Joannis, 1930 : 637. Erroneous type-species designation.]

Head large. Frons rounded, narrow, its scaling rough or smooth. Vertex short, with erect, compact, woolly scaling. Eye large. Ocellus usually present, inconspicuous, sometimes weak or absent. Chaetosema elliptical, adjacent to eye, directed laterally, with long radiating setae. Antenna variable in length, more than half, less than three-quarters length of fore wing; bipectinate in ♂, compressed, laminate in ♀, postaxial pectinations in ♂ usually considerably longer than preaxial ones; pectinations flat, spatulate, capable of folding like slats of a Venetian blind. Labial palpus long, more or less equal in the sexes, obliquely or fully upturned, exceeding level of vertex; first segment very short; second segment long, cylindrical, slightly curved, not reaching level of vertex; third segment more slender, cylindrical, acuminate, varying from two-thirds to fully as long as second segment. Maxillary palpus short, distally somewhat dilated with scales, mesally directed. Proboscis long, strong, basally widened and scaled. Body robust, abdomen exceeding hind wing. Legs fairly long, robust; spurs long, outer somewhat shorter than inner; tarsi ventrally spined. Fore wing long, narrow, usually two and a half to three times as long as wide; in ♀ a little wider and with apex more rounded than in ♂; costa straight, gently arched or weakly sinuate; apex rounded; termen generally weakly rounded and a little oblique; tornus oblique or rounded; posterior margin nearly straight, but convex near base. Costal area wide. Cell more than half length of wing. Anterior discocellular vein short, at a distinct angle to middle discocellular. *Sc* separated from radial stem and R_1. R_1 arising from cell. R_2 from before end of cell. R_{3+4} stalked with R_5 for a short distance; R_3 and R_4 with a short stalk beyond separation of R_5. M_1 arising at junction of anterior and middle discocellular veins, obliquely divergent from R_5 at base. M_2 and M_3 short-stalked from posterior angle of cell. Cu_1 from a little behind posterior angle. Cu_2 variable in position, always from well out on cell. Anal fold strong. Terminal part of *CuP* developed or absent. A_1 long and strong, connected with A_2 by an outwardly oblique cross-vein, or A_2 looped to A_1. Hind wing long and narrow; apex narrowly rounded, termen broadly rounded, anal angle rounded. Costal area wide. Cell about half length of wing. Discocellular vein strongly angled or incurved at middle; anterior and posterior angles of cell acute, posterior angle projecting further distad than anterior angle. $Sc+R_1$ long and straight, reaching apex of wing. *Rs* weaker than $Sc+R_1$, paralleling it closely to beyond middle of wing, but not anastomosing with it, diverging distally. M_1 stalked with *Rs*. M_2 and M_3 from posterior angle of cell, basally approximated or short-stalked. Cu_1 from cell somewhat behind posterior angle; Cu_2 from cell at two-thirds from base. *CuP*, A_1 and A_2 present. Frenulum of ♀ with two long setae.

Genitalia ♂ (Figs 25–41, 43, 44, 137–218). Uncus slender: in *griseata*- and *hieratica*-groups shorter and pyriform, bearing anteriorly directed setae on each side; in other groups with distal part slender, rod-shaped, with sparse, laterally directed setae on each side. Gnathos wide, with broad, flat, posteriorly curved arms, acutely angled mesally, joined to form a long, strong, tapering and acuminate process, broadly curved dorsad at some point in its length. Transtilla strong, of even width, V-shaped or arcuate, often with a more heavily sclerotized dorsal bar. Tegumen wide, with pronounced shoulders; its anterior margin with a narrow, V-shaped, medially deeply emarginated sclerite and its posterior margin with a broad semicircular or subtriangular sclerite. Vinculum narrow, ventrally flattened, with a pair of small accessory sclerites. Valve variable in form; costa strengthened; mesal surface strongly setose; usually with a low ridge-like clasper of varying form, absent in most of *zemire*-group. Juxta well developed, divided into a pair of lateral sclerites, each with dorsal and ventral processes directed medially, dorsal process articulating with lateral sclerite of anellus; this sclerite of varying form, generally linguiform and spinose, directed anteromedially when retracted (Figs 25–32). Dorsal medial catena spines on anellus large, small or absent (Figs 33–40). Manica long, tapering; medially directed sclerotized bands supporting part of length. Lateral sclerite of anellus hinging on articulation with juxta, capable of reflexion or extension as aedeagus is retracted or protruded (Fig. 33). Extension or reflexion of lateral sclerite independent of eversion or inversion of anellus in dissected genitalia with acdeagus removed. Aedeagus long, narrow, tubular, expanded distally, narrowly rounded basally; ductus ejaculatorius arising subbasally; aedeagus rugose at ventral connection to vesica, usually heavily spinose; rugose area longitudinal or transverse, apposed on dorsal connection by longitudinal rugose tissue or longitudinal bands of sclerotization. Junction of aedeagus with vesica at rugose area capable of reflexion, both before and after eversion (Fig. 41). Vesica long and tubular, with variable area and number of minute spines dorsally and ventrally at base. Cornuti present, deciduous to some extent, grouped in clusters or long bands of varying size, in various combinations: two larger dorsolateral clusters and one smaller ventromedial cluster, or, two large dorsolateral clusters, sometimes with one either smaller or absent.



Figs 25–32 ♂ genitalia. Details of left juxta sclerite and its connection with lateral sclerite of anellus in representative species of *Vitessa* to show variation within the genus. (25) *V. griseata* Kenrick. (26) *V. zemire nephritica* subsp. n. (27) *V. hieratica* Swinhoe. (28) *V. stettina* Swinhoe. (29) *V. hemiallactis hemiallactis* Meyrick. (30) *V. pyraliata latialbata* subsp. n. (31) *V. plumosa plumosa* Hampson. (32) *V. suradeva rama* Moore.



Figs 33–40 ♂ genitalia. Details of dorsal catena of anellus in representative species of *Vitessa* to show variation within the genus. Fig. 33 also shows the juxta, lateral sclerites and everted, reflexed anellus to illustrate the position of the catena in relation to these parts. (33) *V. griseata* Kenrick. (34) *V. cyanea cyanea* Hampson. (35) *V. hieratica* Swinhoe. (36) *V. stettina* Swinhoe. (37) *V. heniallactis admiralitatis* subsp. n. (38) *V. pyraliata latialbata* subsp. n. (39) *V. plumosa plumosa* Hampson. (40) *V. suradeva suradeva* Moore.

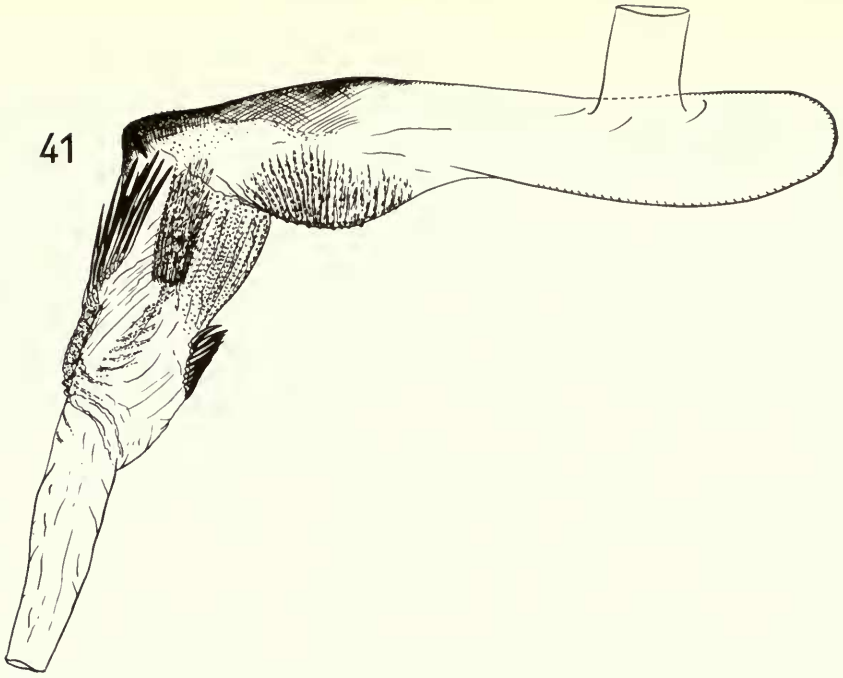


Fig. 41 ♂ genitalia. Lateral view of aedeagus illustrating everted vesica in reflexed position. *Vitessa pyraliata pyraliata* Walker.

GENITALIA ♀ (Figs 226–268, 272–314, 316–318). Ovipositor lobes long, fairly wide, dorsally fused and produced posteriad; posterior surface setose, margins with a moderately thick fringe of longer setae; longer setae and some of the smaller, round, tubular and simple, a varying number of smaller setae flattened and bearing spines for most of their length. Posterior apophysis curved, of moderate thickness, mostly blunt-tipped. Anterior apophysis longer, thicker, weakly sinuate, mostly blunt-tipped. Eighth tergite broad, indented posteromedially, bluntly protruded anteromedially; densely setose posteriorly and laterally. Ostium wide. Posterior ostial sclerite with posterior margin curved; anterior margin with lateral prolongations of varying length and shape, sometimes expanded toward mid-line to form large bullae. Anterior ostial sclerite with posterior margin recurved, wrinkled. Antrum wide, variably extended anteriorly, posterior part sometimes weak. Ostial end of ductus bursae mostly funnel-shaped, wrinkled, with weak lateral sclerotizations; continuing as a slender membranous tube to corpus bursae. Corpus bursae globular or oval, membranous; with two depressed, finely denticulate signa, with paired denticulate areas, or without signa.

REMARKS. We recognize eight species-groups. In the *griseata*-group the valve has a small, central, almost vestigial clasper; the uncus is pyriform-subtriangular, as in *Cosmethella*; the hind wing, as in *Cosmethella*, is black. In the *hieratica*-group the uncus is similar in shape but the valve is armed on the posterior margin with a small, pointed clasper; the discal area of the hind wing is white. In the remaining six groups the uncus has a wide basal portion and a rod-like distal portion, the latter decurved, fitting closely into the curve of the gnathos and bearing sparse lateral setae. In the *suradeva*-group the costa of the valve is curved at the base, enabling the valve to open horizontally rather than obliquely; in the remaining groups the costa of the valve is straight basally, as in the *griseata*-group. The *zemire*-group has black hind wings and a fluted valve, mostly with no clasper; the condition of the uncus is transitional from that in the *griseata*- and *hieratica*-groups to that of the remaining five groups (including the *suradeva*-group, above), the basal portion being less sharply differentiated from the rod-like distal portion than in the latter series of groups. The *stettina*-group has a weak clasper on posterior margin of the narrow valve and in the ♀ the antrum is weakly sclerotized. In the *hemiallactis*-group the valve is wide

and basally constricted, the clasper is long, serrate and well developed and in the ♀ the ostial sclerotization is strong. In the *plumosa*-group the clasper of the valve has a strong, truncate and bifid-tipped ventral process, the ostial chamber has a complex folded sclerite on each side. In the *pyraliata*-group the clasper of the valve is coarsely serrate and the margins of the ostial chamber are wide and heavily sclerotized. Within the species-groups, spined setae on the ovipositor lobes are most easily seen in the *pyraliata*-group and least easily seen in the *griseata*- and *zemire*-groups. To be distinguished easily the spined setae require study under a compound microscope; the examples shown in Figs 316–318 were photographed at about × 250 magnification by the use of differentiated interference-contrast microscopy.

Biology. Available information on the life-history is given in detail below, under *Vitessa suradeva rama*. The larvae of the species are gregarious web-makers on the undersides of leaves of *Chailletia sumatrana* Miquel (= *Dichapetalum gelanioides* subsp. *gelanioides* (Beddome) Engler) (Dichapetalaceae). They are gregarious when young, solitary later, commonly sitting in a 'semilooper' position. They are long, oily-black, marked with white, with orange head, anal segment and prolegs. Their bright colours may be aposematic. The pupa is formed in a cocoon just under the ground against sides of stones or in a similar protected place. *V. suradeva* ordinarily flies in the daytime and visits flowers in company with hypsids. Specimens of *V. hemiallactis hemiallactis* from Waigeo, Camp Nok, collected by Cheesman, are labelled as being diurnal. However, the adults of at least some of the species, including *V. suradeva*, *griseata*, *zemire*, *hollandi* and *hemiallactis*, are active nocturnally, though the bright colours might seem better adapted to diurnal life. The general aspect is that of aposematic or mimetic insects (see Introduction, p. 242). This is supported by the presence of noctuoids of closely similar appearance in the same areas, and by the similar patterns and parallel geographical variation of the forewings in species of different groups, e.g. the greenish *V. griseata* and *V. barretti* in the highlands of New Guinea, the black and white *V. zemire*, *V. stettina* and *V. hemiallactis* at lower altitudes in New Guinea, the greenish *V. glaucoptera* and *V. zemire nephritica* in Queensland, and the dark, white-spotted *V. pyraliata triangulifera* and *V. philippina* in Luzon.

Distribution. Northern India and Sri Lanka to Queensland and Samoa.

Biogeography (Figs 2–24). The *griseata*-, *zemire*-, *stettina*- and *hemiallactis*-groups are mainly Papuan; all extend west into the Moluccas and the *stettina*-group reaches the Philippines. The *hemiallactis*- and *zemire*-groups extend south to Queensland and south-east into the Solomon Islands. The *zemire*-group ranges farther, to the New Hebrides, Fiji and Samoa. The *hieratica*-, *plumosa*-, and *pyraliata*-groups are centred on the Malayan subregion; the *hieratica*-group ranges from Sumatra to Borneo, the *plumosa*-group through the Lesser Sunda Islands and north to Salajar, and the *pyraliata*-group from the Nicobar Islands and possibly Sri Lanka to the Philippines, Flores and possibly northern Australia. The *suradeva*-group is Indo-Malayan, ranging from Sri Lanka and the Himalayas to Borneo.

Turning to distributions within the groups, the *griseata*-group has four known species. *V. griseata* is widely distributed in New Guinea at altitudes from about 450 to 1850 m. This species is replaced by the closely related *V. brandti* in the mountains of New Britain. The remaining two species of the group, *V. talboti* and *V. nobilis*, occur in Seram and Ambon respectively; the former at least appears to be a mountain species.

The *zemire*-group consists of four species. The polytypic *V. zemire* extends from the Moluccas to the New Hebrides. *V. vitialis* in Fiji and *V. tamsi* in Samoa form a closely related pair. *V. cyanea*, the fourth species of the group, overlaps *V. zemire* in eastern New Guinea and adjacent coastal islands and has a widely disjunct subspecies in the Moluccas. The subspecies of *V. zemire* form regional groupings. In the New Guinea subspecies the postmedial fascia of the fore wing is very wide; in the Queensland subspecies the fascia is strongly green-tinted; it is equally wide, but tends to diffuse across the medial region to meet similar diffusion from the antemedial fascia. The two Moluccan and one New Hebrides subspecies have somewhat narrower postmedial fasciae; the remaining two subspecies from the Bismarck and Solomon Islands have much narrower postmedial fasciae.

The single known species of the *hieratica*-group is rare in collections. So far it is known from Borneo and Sumatra.

The three species of the *stettina*-group are largely allopatric. *V. stettina*, a species with wide pale fasciae on the fore wing, ranges from Waigeo and the Arfak Mountains to eastern Papua. It is the dominant species in southern New Guinea, but its range is widely overlapped by that of *V. hollandi*, a species with restricted pale fasciae. *V. hollandi* occurs in the Schouten Islands sympatrically with the externally almost indistinguishable *V. gemina* of the *pyraliata*-group. A distinct subspecies of *V. hollandi* occurs in Sulawesi; two specimens are known from the islands in the Moluccan group and a single specimen from New Britain; though these probably represent distinct subspecies we do not name them here. In the Philippines the *stettina*-group is represented by a distinct species, *V. philippina*, which is dark, with reduced light spots; externally this species closely resembles the sympatric *V. pyraliata triangulifera*, of the *pyraliata*-group.

The *hemiallactis*-group has six species. Of these the polytypic *V. hemiallactis* is the most widely distributed, with one subspecies in Halmahera and Obi in the Moluccas, a second in New Guinea, a third in the Admiralty Islands, a fourth in the Bismarcks and a fifth in the Solomon Islands. The fore wing patterns parallel those of sympatric members of the *stettina*-group. The New Guinea subspecies has moderately narrow, at most weakly interrupted, white fasciae, almost identical with those of *V. hollandi hollandi*, whereas in the remaining subspecies the fasciae are very much reduced, being both narrower and more widely interrupted. Overlapping *V. hemiallactis hemiallactis* in geographical range, though mostly occurring at somewhat higher altitudes, is the slightly larger second species, *V. intermedia*. The wide greenish white fasciae of this species parallel the markings of *V. stettina*, which occurs both with *V. intermedia* and at lower altitudes. In Queensland the geographically representative species *V. glaucoptera* has the fore wing green-suffused, like that of *V. zemire nephritica* from the same area. At altitudes of 600 to about 1850 m and possibly higher in New Guinea there occurs another representative species with strongly greenish fore wings, namely *V. barretti*; this species superficially resembles the more abundant *V. griseata*, which occurs together with it. A fifth species, *V. ternatica*, is known from the Moluccas from Ternate to Buru and Seram. A sixth, *V. cristobalensis*, is known only from San Cristobal in the Solomon Islands. A seventh species is known to us from a single ♂ specimen which most closely resembles *V. ternatica*; however, its locality, given on the data label as 'Japan', is regarded as erroneous and the species is described without being named in this paper.

The *pyraliata*-group includes seven species. The most widely distributed is *V. pyraliata*, which ranges from Sri Lanka to the Philippines, Sulawesi and Flores, in three subspecies. *V. pyraliata latialbata* has the widest range. It occurs in the Malay Peninsula, Sumatra, Java, Borneo and part of Sulawesi; there are dubious records from Sri Lanka and Australia. The rather similar *V. pyraliata triangulifera* replaces it in the Philippines. The more divergent nominate subspecies is found in part of Sulawesi and in Flores. The remaining species of the group have restricted ranges. *V. nicobarica* is restricted to the Nicobar Islands. Four vicarious species, *V. muluana*, *kolakalis*, *sulaensis* and *gemina*, occur in Sarawak, Sulawesi, Sula Besi and the Schouten Islands, Geelvink Bay, respectively. *V. splendida* lives sympatrically with *V. pyraliata triangulifera* in the Philippines.

The single species of the *plumosa*-group is geographically variable. It extends through the Lesser Sunda Islands from just west of Wallace's Line in Bali to Dammer Island; a distinct subspecies is found in Salajar, off the south coast of Sulawesi. Although we include all the populations from the Lesser Sunda Islands provisionally in the nominate subspecies, the limited material we have seen suggests that there may be geographical variation; specimens from the middle of the chain in Lombok and Sumbawa are large and dull-coloured, whereas those from Bali in the west and from the eastern islands of the group are smaller and brighter. More material is needed before these differences can be evaluated.

The *suradeva*-group has two species. *V. teleroma* ranges from Perak to Borneo; there is some variation in this species which more material may show to be geographically based. *V. suradeva* has two subspecies. One ranges from W. Bengal and Assam to Burma, Thailand and Vietnam, the other is found in southern India and in Sri Lanka.

There appear to be two possible interpretations of the geographical distribution of the *Vitessa* complex. On the one hand, the concentration of species and species-groups in the Papuan region

may be taken as evidence that the complex has originated and undergone most of its evolution there, and that it has spread secondarily into the Indo-Malayan region. Alternatively, it may be supposed that the groups now confined to the Papuan region were previously widespread, but that they have been displaced in the west by the species that now exist there. On either hypothesis it must be assumed that there has been active local differentiation in most of the surviving species-groups.

NOMENCLATURE. The genus has mostly been cited as *Vitessa* Moore. However, the name was changed to *Cosmethis* Hübner, [1820] in the BMNH collection many years ago, presumably by Hampson when he recognized the validity of Hübner's generic names, though Hampson (1896*a* : 145; 1896*b* : 502) had earlier used *Vitessa* in his published work on the genus. *Cosmethis* was used by Janse (1924; 1928) and by de Joannis (1930). The latter author designated *Phalaena zemire* Stoll as type-species of *Cosmethis*. However, this designation is antedated by that by Kirby (1892 : 498) of *Phalaena barbara* Stoll, 1781, now referred to the Geometridae. The name *Cosmethis* therefore cannot be applied to the present genus and the more familiar name *Vitessa* must be used.

Key to the species and subspecies of *Vitessa*

1	Hind wing upperside uniformly black, fringe white 2
–	Hind wing whitish buff, with or without broad black or fuscous terminal band . . 17
2 (1)	Fore wing upperside greenish grey, with orange basal area outwardly bordered by fine blue-black subbasal fascia. New Guinea . . . . . ***griseata*** (p. 267)
–	Fore wing with fascia in medial area 3
3 (2)	Fore wing upperside with broad violet-grey medial fascia. New Britain . ***brandti*** (p. 269)
–	Fore wing with medial fascia other than violet-grey 4
4 (3)	Fore wing upperside with large, square white medial fascia. Seram . . ***talboti*** (p. 269)
–	Fore wing with more than one white marking in medial area 5
5 (4)	Fore wing upperside with narrow white medial fascia divided into two spots. Ambon ***nobilis*** (p. 270)
–	Fore wing with more than one fascia 6
6 (5)	Fore wing upperside with two white transverse fasciae, sometimes joined by medial diffusion; basal area orange 7
–	Fore wing with two pale yellow transverse fasciae, always separated; subbasal area orange 16
7 (6)	Fore wing upperside with postmedial fascia joining white terminal lines (*cyanea* subspecies) 8
–	Fore wing with postmedial fascia not joining white terminal lines (*zemire* subspecies) . 9
8 (7)	Fore wing upperside with orange basal area not passing *Cu*; ♂ genitalia with termen of valve narrowly rounded. Seram . . . . . ***cyanea ceramensis*** (p. 273)
–	Fore wing with orange basal area indented at *Cu* but reaching posterior margin; ♂ genitalia with termen of valve truncated. Papua New Guinea and Fergusson Island ***cyanea cyanea*** (p. 273)
9 (7)	Fore wing upperside with wide creamy white postmedial fascia, width nearly equal to half width of wing at centre; antemedial fascia narrower than subbasal fascia; basal area complete. Northern Moluccas . . . . . ***zemire expansa*** (p. 275)
–	Fore wing with markings not as above 10
10 (9)	Fore wing upperside with wide chalky white postmedial fascia, width equal to half width of wing at centre; antemedial fascia narrower than subbasal fascia; basal area indented; hind wing underside with white apical area. Southern Moluccas . ***zemire zemire*** (p. 276)
–	Fore wing with markings not as above 11
11 (10)	Fore wing upperside with antemedial fascia diffused medially but not joining postmedial fascia, as wide as subbasal fascia; width of postmedial fascia more than half width of wing at centre. New Guinea and coastal islands . . . ***zemire temerata*** (p. 276)
–	Fore wing with medial diffusion of fasciae joining, or fasciae well separated . . 12
12 (11)	Fore wing upperside with antemedial fascia irregularly diffused medially, meeting diffusion from postmedial fascia, especially along posterior margin. Queensland ***zemire nephritica*** (p. 278)
–	Fore wing with fasciae well separated, without such diffusion 13

13 (12) Fore wing upperside with orange basal area bearing subcostal black dot half width of eye; postmedial fascia twice as wide as antemedial fascia in ♂, antemedial fascia in ♀ reduced to hair-line. Umboi Island . . . . . ***zemire coronis*** (p. 278)

– Fore wing with markings not as above 14

14 (13) Fore wing upperside with subcostal black dot half width of eye or much less; both white fasciae reduced in width, postmedial fascia one-third width of wing at centre. New Britain and New Hannover . . . . . ***zemire novaebritanniae*** (p. 279)

– Fore wing similar to above; hind wing underside lacking white apical area but having white spot at apex of cell 15

15 (14) Fore wing upperside with orange basal area indented at A_1 with blue-black; postmedial fascia narrow, less than half width of wing at centre. Solomon Islands ***zemire solomonis*** (p. 280)

– Fore wing with postmedial fascia broad, equal to half width of wing at centre. New Hebrides . . . . . ***zemire cheesmanae*** (p. 280)

16 (6) Fore wing upperside with postmedial fascia directed towards posterior margin well basad of tornus, narrow, width less than half width of wing at centre. Fiji . ***vitialis*** (p. 281)

– Fore wing with postmedial fascia directed towards tornus, broad, width equal to half width of wing at centre. Samoa . . . . . ***tamsi*** (p. 283)

17 (1) Hind wing upperside with infuscation from costa reaching *CuP* or farther, eliminating white from cell; fore wing upperside with orange subbasal area reaching posterior margin. Borneo and Sumatra . . . . . ***heiratica*** (p. 285)

– Wings not with this combination of characters 18

18 (17) ♂ genitalia with anellus lacking catena spines; ♀ genitalia with corpus bursae lacking signum or small denticulate area 19

– ♂ genitalia with anellus bearing catena spines; ♀ genitalia with corpus bursae bearing signa or small denticulate areas 22

19 (18) Fore wing above with about six white terminal lines; ♀ genitalia with funnel-shaped antrum (♂ unknown). Philippines . . . . . ***philippina*** (p. 286)

– Fore wing with more than six white terminal lines; ♀ genitalia with cup-shaped antrum 20

20 (19) Fore wing upperside with postmedial and antemedial fasciae broad and complete. New Guinea . . . . . ***stettina*** (p. 287)

– Fore wing upperside with both fasciae narrow, incomplete or indented . . . 21

21 (20) Fore wing underside with postmedial fascia divided into two spots. Sulawesi ***hollandi wallacealis*** (p. 289)

– Fore wing with postmedial fascia a single large oval spot. New Guinea ***hollandi hollandi*** (p. 290)

22 (18) ♂ genitalia with clasper on valve long, strap-shaped and serrulate along part or whole of free edge; ♀ genitalia with ductus seminalis arising below or just above base of antrum 23

– ♂ genitalia with clasper short, mostly parallel to posterior margin, free edge with small ridge and rounded scoop-like process; ♀ genitalia with ductus seminalis arising mid-way up swollen extended base of antrum (*suradeva*-group) 42

23 (22) ♂ genitalia with clasper with large ridges or tooth-like points at posterior margin with pronounced acuminate ridges mid-way; ♀ genitalia with posterior portion of antrum trapezoidal, or broadly extended and cup-shaped anteriorly 24

– ♂ genitalia with clasper with pronounced truncate process mid-way; ♀ genitalia with antrum broadly rounded posteriorly, acutely funnel-shaped anteriorly with V-shaped dorsal crease (*plumosa*-group) 41

24 (23) Fore wing upperside with antemedial fascia reduced to minute spot on costa and larger narrow triangular spot on *Cu* pointing medially; hind wing upperside with white area reduced to a comma-shape directed basally. Moluccas . . . ***ternatica*** (p. 292)

– Combined fore wing and hind wing markings not as above 25

25 (24) Fore wing upperside with postmedial fascia divided into two spots with terminal margins at right-angles to posterior margin of wing. Moluccas . ***hemiallactis moluccana*** (p. 295)

– Fore wing with postmedial fascia divided into two spots or complete but terminal margins oblique to posterior margin 26

26 (25) Fore wing upperside with postmedial and antemedial fasciae indented or complete, fasciae approaching but not joining at any point. New Guinea . ***hemiallactis hemiallactis*** (p. 296)

– Fore wing with postmedial and sometimes antemedial fascia distinctly divided into two or more spots, or fasciae complete and partially fusing 27

27 (26) Fore wing upperside with antemedial fascia narrowing almost to a hair-line but not divided; postmedial fascia with two spots; hind wing upperside with broad black terminal band. Admiralty Islands . . . . . ***hemiallactis admiralitatis*** (p. 297)

– Fore wing with antemedial fascia narrow, or broad, or divided into two spots; postmedial fascia divided into two or more spots, or complete; hind wing upperside wholly creamy white or with black terminal band 28

28 (27) Hind wing upperside with large oval white area not reaching anal margin; fore wing upperside with terminal white lines well apart from postmedial fascia. Bismarck Archipelago . . . . . ***hemiallactis lustrans*** (p. 298)

– Hind wing with white area reaching anal margin except where white almost obliterated by infuscation encroaching from costa; fore wing with terminal white lines separate from or joining postmedial fascia 29

29 (28) Fore wing upperside with fasciae partially fusing leaving variable amounts of blue-black medial fascia exposed; orange subbasal area reduced leaving blue-black subbasal fascia broad at costa. Papua New Guinea . . . . . ***intermedia*** (p. 299)

– Fore wing with fasciae more completely fused, or quite separated and divided into spots 30

30 (29) Fore wing upperside with fasciae almost completely fused leaving medial fascia as a longitudinal short streak; expanse of fore wings 60 mm or over. Papua New Guinea ***barretti*** (p. 300)

– Fore wing with fasciae similar, but fore wing expanse less, or fasciae separated . . 31

31 (30) Fore wing upperside with fasciae almost completely fused leaving medial fascia as a short triangular spot; expanse of fore wings 50 mm or less. Queensland . ***glaucoptera*** (p. 301)

– Fore wing with fasciae separated and divided into spots 32

32 (31) Fore wing underside with white terminal lines present from R_4 to A_{1+2}. San Cristobal Island . . . . . ***cristobalensis*** (p. 302)

– Fore wing with white terminal lines absent or from R_4 to Cu_1 33

33 (32) Hind wing upperside of ♂ unicolorous whitish buff, of ♀ mainly whitish buff, with narrow and ill-defined black costal and terminal borders. Nicobar Islands . ***nicobarica*** (p. 303)

– Hind wing of ♂ and ♀ with broad well-defined black costal and terminal borders . . 34

34 (33) Hind wing upperside with white extending along over half of anal margin; fore wing upperside with lower spot of antemedial fascia distinctly rectangular. Malaysia ***pyraliata latialbata*** (p. 306)

– Hind and fore wing markings other than in above combination 35

35 (34) Fore wing upperside with orange subbasal area restricted between *Sc* and A_{1+2}; hind wing upperside with white extending along half of anal margin. Philippines ***pyraliata triangulifera*** (p. 308)

– Fore and hind wing markings other than in above combination 36

36 (35) Hind wing upperside with white variably extended and restricted along anal margin, from a third to complete restriction; fore wing upperside with orange subbasal area from just above *Sc* to A_{1+2}; patagium mostly black. Sulawesi . . ***pyraliata pyraliata*** (p. 308)

– Hind and fore wing markings and colour of patagium other than in above combination 37

37 (36) Hind wing upperside with white variably extended along anal margin from half to about a third; fore wing upperside with orange subbasal area to within hair-line of costa; patagium mostly orange. Sulawesi . . . . . ***kolakalis*** (p. 309)

– Hind wing with white extending along half or more of anal margin 38

38 (37) Fore wing upperside with orange subbasal area not passing A_{1+2}; white terminal vein-lines very short. Moluccas . . . . . ***sulaensis*** (p. 310)

– Fore wing with subbasal area nearly reaching posterior margin 39

39 (38) ♀ genitalia with corpus bursae with two round, depressed denticulate signa (♂ unknown). Sarawak, Sabah . . . . . ***muluana*** (p. 311)

– ♀ genitalia with corpus bursae with minute denticulate patches 40

40 (39) ♀ genitalia with antrum funnel-shaped (♂ unknown). Schouten Islands, Geelvink Bay ***gemina*** (p. 312)

– ♀ genitalia with antrum deep and cup-shaped (♂ unknown). Philippines . ***splendida*** (p. 313)

41 (23) Hind wing upperside with black border along termen narrowing abruptly before reaching tornus. Sumbawa . . . . . ***plumosa plumosa*** (p. 316)

– Hind wing with black border narrowing evenly from costa to tornus. Salajar
plumosa salayerensis (p. 317)

42 (22) Fore wing upperside with antemedial fascia finely parted at cell. Malaysia . *teleroma* (p. 317)

– Fore wing with antemedial fascia indented but complete 43

43 (42) ♂ genitalia with aedeagus with right cluster of cornuti about half as long as left; ♀ genitalia with antrum nearly as wide as long. Northern India to Vietnam *suradeva suradeva* (p. 320)

– ♂ genitalia with right cluster of cornuti noticeably smaller, about one-third as long as left; ♀ genitalia with antrum much narrower than long. Southern India and Sri Lanka
suradeva rama (p. 321)

The *griseata*-group

DIAGNOSIS. Fore wing above: mostly greenish, with or without a broad, diffuse, violet-grey transverse medial fascia but without a distinct black wedge-shaped discocellular dot or dash or narrow transverse medial fascia as in greenish-winged species of the *zemire*- and *hemiallactis*-groups; or fore wing above: largely black, with complete or interrupted whitish transverse medial fascia, without postmedial and antemedial fasciae as in other species-groups. Hind wing black, as in *zemire*-group. Genitalia in ♂ with uncus narrowly pyriform, a short zone of oblique, close-set setae dorsolaterally, as in the *hieratica*-group, but with setae less differentiated; valve falcate, with small, central, almost vestigial clasper, not ridge-like or projecting marginal clasper as in other species-groups; anellus with large lateral clusters of spines as in *zemire*-group. Genitalia in ♀ with weakly developed spined setae on ovipositor lobes; posterior ostial sclerite bearing two lateral bullae; anterior margin of anterior sclerite strongly wrinkled; antrum sclerotization short; anterior end of ductus bursae membranous, broadly funnel-shaped; corpus bursae with two round, depressed, denticulate signa.

Vitessa griseata Kenrick, 1907
(Figs 4, 25, 33, 52, 53, 138, 173, 204, 226, 316)

Vitessa griseata Kenrick, 1907, *Proc. zool. Soc. Lond.* **1907** : 75, pl. 3, fig. 45. LECTOTYPE ♂, NEW GUINEA: Papua, Dinawa, 4000 ft [1200 m], ix.1902 (*A. E. Pratt*) (BMNH), here designated [examined].
Cosmethis griseata (Kenrick); Janse, 1928 : 88.

♂, ♀. 44–68 mm. Frons pale orange. Vertex bright orange. Eye dark brown. Ocellus weak, not conspicuous, dark brown. Chaetosema with pale yellowish setae. Antenna dark fuscous, anterior surface of scape and basal segment orange; posterior surface of apical third of shaft white. Labial palpus blackish fuscous; orange on ventral surfaces of first and second segments, minute amount at base of third. Maxillary palpus orange. Basal scaling of proboscis black, admixed with orange at base. Neck region orange. Thorax above: orange; patagium and tegula orange, each with blue-black spot at centre. Abdomen above: black; narrow whitish grey posterior line on each segment, anal tuft orange. Body below: black with bluish reflections; pectus with considerable orange scaling; whitish grey abdominal lines wider than above; anal tuft orange. Legs blackish fuscous, with extensive pale grey scaling on coxae, femora and tibiae. Fore wing above: basal area orange bearing two black spots on *R*, some black posteriorly; oblique subbasal fascia a blue-black line. Remainder of wing silky greenish grey, with fine black terminal lines, mostly between veins, from *R* to *Cu*, variable in number. Fringe anteriorly black, posteriorly pale grey. Hind wing above: black with some metallic lustre. Fringe: base grey, terminally whitish grey, anal margin black. Fore wing below: black, slightly metallic; an oblique, oblong, cream-coloured postmedial fascia, almost reaching posterior margin; apex with diffuse longitudinal greenish grey lines; fringe dark grey anteriorly, whitish grey posteriorly; retinaculum dark grey. Hind wing below: similar to fore wing but with fringe uniformly whitish grey.

GENITALIA ♂ (Figs 25, 33, 138, 173, 204). Uncus relatively short and wide, base constricted, basal part laterally convex with ventral foramen; distal part flattened, curved, acuminate, with a dorsolateral zone of oblique setae. Gnathos with flattened, medially decurved, wide lateral arms and with compressed, basally straight, distally upturned and acuminate, medial process. Transtilla shallowly V-shaped, of even width. Tegumen with medially broadened posterior sclerite and with anterior sclerite widely emarginated medially. Vinculum ventrally narrow and flattened. Valve long and narrow, distally falcate, extreme tip very narrowly rounded and terminal margin excised before it; costa strongly inflated; mesal surface of valve heavily setose in distal two-thirds of costal region only; clasper a small erect three-sided ridge at axis of valve, less than half valve length from base. Juxta with nearly rectangular lateral sclerites,

each bearing a dorsal, somewhat decurved, thorn-shaped, thinly setose process and ventral, slender, ribbon-shaped process, ventral process directed posteriorly and nearly reaching mid-line, supporting base of anellus; anellus (Figs 33, 173) arising from juxta processes with large lateral, medially directed sclerite bearing large anteriorly directed spines, sclerite connected directly to dorsal process (Fig. 25); ventral surface of anellus between the sclerites longitudinally rugose, lightly sclerotized and centrally spinose; dorsal surface with medial catena (Fig. 33) consisting of an elongated, ovoid area, minutely spinose; most of manica supported by dorsal sclerotized caliper-shaped bands, narrowing and less sclerotized towards tip. Aedeagus of moderate length, expanded distally, slightly curved, base narrowly rounded; ductus ejaculatorius arising basad of middle; scale-like spines extending medially for a short distance from vesica along dorsal and ventral surfaces of aedeagus; base of vesica bulbous dorsally at posterior end of aedeagus; dorsal and ventral surfaces covered with scale-like spines from base of vesica to about half-way along larger cornuti clusters, the spinose area longitudinally rugose between cornuti clusters; vesica bulbous immediately distad of this region. Cornuti (Fig. 204) grouped in three clusters of spines: two large, more basal, dorsolateral clusters of unequal size, the left one longer and extending farther distad than the right, and a much smaller, distal, mid-ventral cluster, bearing thinner spines and arising from distal end of an oblique sclerotized band.

Genitalia ♀ (Figs 226, 272, 316). High, wide ovipositor lobes, dorsally fused and produced posteriorly; surface densely setose, margin with row of well-separated longer setae; spiny setae not easily seen (Fig. 316). Posterior apophysis fairly long, slender, weakly curved, with spatulate tip. Anterior apophysis similar but longer. Posterior ostial sclerite (Fig. 272) broadly sclerotized, posterior margin angularly excised, anteromedial part broadly divided on mid-line by a narrow sulcus, laterally a pair of wrinkled bullae with sinuate, posteriorly converging inner margins, posteriorly denticulate. Anterior sclerite narrow, wrinkled, reflected, heavily denticulate. Antrum short, collar-shaped. Ductus bursae membranous, posteriorly widened and flattened, lightly sclerotized. Corpus bursae globular, membranous, with a pair of large, heavily sclerotized, depressed, denticulate signa.

Remarks. This species is fairly common at most altitudes in many parts of New Guinea. The only sympatric species with which it might be confused is *V. barretti*, which can be separated by the black discocellular spot of its fore wing and the large white area on the hind wing. The closest relative of *V. griseata* is *V. brandti* from New Britain, which has a contrasting violet-grey transverse medial fascia on the upperside of the fore wing.

Biology. Early stages and host-plant unknown. Moths collected by many collectors in most months of the year.

Distribution (Fig. 4). New Guinea: Irian Jaya; Papua New Guinea, 500–2150 m.

Material examined

Paralectotypes. 6 ♂, 2 ♀, data as lectotype (genitalia slide no. 15286; BMNH; CMAG, Birmingham).

New Guinea: 1 ♂, 3 ♀, Irian Jaya, C. Arfak Mts, Ninay Valley, 1050 m, xi.1908–i.1909 (*A. E. Pratt*) (BMNH); 1 ♂, 3 ♀, I. J., Arfak Mts, 1200 m, ii–iii.1909 (*C. B. Pratt*) (BMNH; CMAG, Birmingham); 1 ♀, I. J., Arfak Mts, 1850 m, iii.1910 (*C. B. & F. B. Pratt*) (BMNH); 1 ♀, I. J., Snow Mts, Setekwa R., ix.1910 (*Meek*) (BMNH); 8 ♀, I. J., Snow Mts, Upper Setekwa R., 600–1050 m, ix.1910 (*Meek*) (BMNH); 2 ♀, I. J., Snow Mts, nr Oetakwa R., up to 1050 m, x–xii.1910 (*Meek*) (BMNH); 2 ♂, 11 ♀, I. J., Mt Goliath, 1500–2150 m, about 139° long. [4°40′ S 139°52′ E], i–ii.1911 (*Meek*) (BMNH; NMNH, Washington); 2 ♂, 2 ♀, Papua New Guinea, Sepik District, Telefomin (Eliptamin), 1350–1700 m, vi–ix.1959 (*Brandt*) (ANIC, Canberra); 1 ♂, 3 ♀, P. N. G., Sepik District, Bainyik, 300 m, x.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., Western Highlands, Jimi R., 1450 m, vii–ix.1961 (*Brandt*) (ANIC, Canberra); 5 ♂, 1 ♀, P. N. G., Finisterre Range, Kiambari, 1350 m, vii–viii.1958 (*Brandt*) (ANIC, Canberra); 1 ♀, P. N. G., Madang District, Finisterre Mts, Naho R. Valley, Budemu, 1250 m, x.1964 (*Bacchus*) (BMNH); 2 ♂, 8 ♀, P. N. G., Morobe District, Finisterre Mts, Wantoat, 1200 m, ix.1957 (*Munroe & Holland*) (CNC, Ottawa); 3 ♀, P. N. G., Gurukor, 600 m, ii.1978 (*Hébert*) (CNC, Ottawa); 8 ♀, P. N. G., Morobe District, near Bulolo, *Araucaria* forest, 1200 m, ix.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., Morobe District, Edie Creek, 2050 m, ix.1957 (*Munroe & Holland*) (CNC, Ottawa); 8 ♀, P. N. G., Bulldog Rd, 3 km S. Edie Creek, 2200 m, viii.1975 (*Hébert & Ward*) (CNC, Ottawa); 1 ♀, P. N. G., same locality, xii.1977 (*Hébert & Harmsen*) (CNC, Ottawa); 5 ♀, P. N. G., Eastern Highlands, Okapa, 1850 m, x.1957 (*Munroe & Holland*) (CNC, Ottawa); 44 ♂, 9 ♀, P. N. G., Dinawa, 1200 m, ix.1902 (*A. E. Pratt*) (BMNH; NMNH, Washington); 11 ♂, 22 ♀, P. N. G., Mt Kebea, 1100 m, and 1850 m, iii–viii.1903 (*A. E. Pratt*) (BMNH; CMAG, Birmingham; NMNH, Washington); 4 ♂, 4 ♀, P. N. G., Upper Aroa R., iii–iv.1903 (*Meek*) (BMNH); 5 ♀, P. N. G., Mafalu [sic], 1850 m, viii.1903 (*A. E. Pratt*) (BMNH); 1 ♂, 2 ♀,

P. N. G., Mafulu, 1200 m, i.1934 (*Cheesman*) (BMNH); 3 ♀, P. N. G., Avola, 1850 m, viii.1903 (*A. E. Pratt*) (BMNH); 2 ♀, P. N. G., Babooni, 1100 m, ix.1903 (*A. E. Pratt*) (BMNH); 1 ♀, P. N. G., Angabunga R., affl[uent] of St Joseph R., 1850 m upwards, xi.1904–ii.1905 (*Meek*) (BMNH); 2 ♂, 3 ♀, P. N. G., Tapini, Loloipa R., Bome, 1900 m, ii–v.1958 (*Brandt*) (ANIC, Canberra); 13 ♂, 19 ♀, P. N. G., Sogeri Plateau, Bisianumu, 500 m, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 26 ♂, 60 ♀, P. N. G., Sogeri Plateau, Mageri, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 10 ♂, 11 ♀, P. N. G., Mambare R., Biagi, 1500 m, i–iv.1906 (*Meek*) (BMNH; MNHN, Paris; NMNH, Washington); 8 ♂, 1 ♀, P. N. G., Hydrographer Mts, 750 m, i–iii.1918 (*Eichhorn Bros.*) (BMNH); 1 ♂, 1 ♀, P. N. G., Amazon Bay area, Doveta, 750 m, vii–ix.1962 (*Brandt*) (ANIC, Canberra); 1 ♂, 1 ♀, no data (CMAG, Birmingham).

Vitessa brandti sp. n.
(Figs 4, 54, 137)

♂. 54 mm. Frons yellow. Vertex orange. Eye and ocellus brown. Chaetosema with pale yellowish setae. Antenna dark fuscous; posterior surface of apical third of shaft white. Labial palpus black, orange on ventral surfaces of first and second segments, third segment entirely black. Maxillary palpus orange. Basal scaling of proboscis black. Neck region orange. Thorax above: orange; patagium orange with posteromesal blue-black spot; tegula orange with similar anterolateral spot. Abdomen above: blue-black, narrow white terminal line on each segment, anal tuft orange. Body below: blue-black; pectus orange; whitish grey terminal abdominal lines, anal tuft orange. Legs blue-black, mid coxa and mid and hind femora with whitish grey scales; hind tibia with shaggy black scales dorsally on basal half. Fore wing above with basal area orange, bearing single small basal blue-black spot and two larger subbasal spots, posterior spot diffuse; subbasal fascia erect, fairly wide, glossy blue-black, sharply defined on both sides. Antemedial fascia a narrow area of jade green, diffuse medially and followed by a broad violet-grey medial fascia, slightly expanded posteriorly. Terminal part of wing jade green with wide black stripes and narrow wedges between veins. Costa narrowly black from base to apex. Fringe black, grey towards tornus. Hind wing above: blue-black with metallic lustre. Fringe fuscous, distal half whitish grey, anal margin black. Fore wing below: blue-black; oval postmedial patch white; faint light grey streaks on a few veins subapically. Hind wing below: like upperside, but with veins of subapical region broadly jade green.

♀. Unknown.

Genitalia ♂ (Fig. 137). In general as for *V. griseata* (p. 267). Uncus broad, gradually tapering from convex base, slightly waisted. Transtilla very shallowly V-shaped. Valve relatively short and broad, distally falcate, extreme tip narrowly rounded; terminal margin at right angles to costa, becoming broadly rounded before forming posterior margin; clasper more than half valve length from base. Aedeagus base broadly rounded.

Remarks. This species is similar in general appearance to *V. griseata*, but is separated externally by the broad violet-grey medial fascia on the fore wing, and by the larger spots on the patagium and tegula. In the ♂ genitalia the broader uncus and the relatively short, broad and truncated appearance of the valve separate this species from *V. griseata* and *V. talboti*. We take pleasure in dedicating this species to Mr W. Brandt, collector of the holotype and of many other interesting Papuan Lepidoptera.

Biology. Early stages and host-plant unknown. Holotype collected some time between June and September.

Distribution (Fig. 4). Bismarck Archipelago: New Britain.

Material examined

Holotype ♂, **New Britain:** Mt Sinewit, 1050 m ('3500 ft'), 27.vi.–17.ix.1963 (*Brandt*) (genitalia slide no. DK 738; ANIC, Canberra).

Vitessa talboti (Janse, 1924) comb. n.
(Figs 4, 55, 56, 139, 174, 227, 273)

Cosmethis talboti Janse, 1924, *Bull. Hill Mus. Witley* **1**: 503. LECTOTYPE ♂, Moluccas: Central Ceram [Seram], Manusela [3°15′ S, 129°38′ E], 1850 m ('6000 ft'), x–xii.1919 (*C., F. & J. Pratt*) (genitalia slide no. 14676/a, Shaffer; TM, Pretoria), here designated [examined].

♂, ♀. 50–56 mm. Frons orange. Vertex orange with a few medial black scales. Eye and ocellus brown. Chaetosema with pale yellowish setae. Antenna black; posterior surface of apical third of shaft white.

Labial palpus black, orange on ventral surfaces of first and second segments, third segment entirely black. Maxillary palpus orange, inner surface black. Basal scaling of proboscis brownish fuscous, a slight sprinkling of orange at extreme base and on sides. Neck region orange. Thorax above: orange; patagium orange with a posteromesal blue-black spot; tegula orange with diffuse anterolateral blue-black spot. Abdomen above: blue-black, a narrow whitish grey terminal line on each segment, anal tuft orange. Body below: black; pectus orange; abdomen black, a whitish grey terminal line on each segment, wider than on dorsal surface; anal tuft orange. Legs black; whitish grey scaling on coxae, ventral surfaces of femora, tips of mid and hind tibiae and bases of tibial spurs; hind tibia with shaggy black scales dorsally on basal half. Fore wing above: basal area orange, reaching *Cu*, bearing single large subbasal spot; broad subbasal fascia black with bluish green reflections; white square medial fascia, reaching posterior margin, postmedial border weakly oblique; costa narrowly black from apex to base, in ♂ costa anterior to medial fascia admixed with white; apical part of wing blue-black with whitish grey lining the veins, separate from medial fascia in ♂, almost touching in ♀; fringe dark grey, white at tornus. Hind wing above: blue-black with metallic reflections; fringe white admixed with grey, black at tornus and anal margin. Fore wing below: dull blackish fuscous; white medial fascia narrower, closer to apex than on upperside, antemedial margin irregular; apical region with traces of whitish grey; fringe as on upperside. Hind wing below: dull blackish fuscous; apical region with white vein-lines; fringe as on upperside.

Genitalia ♂ (Figs 139, 174). In general as for *V. griseata*. Uncus broad, gradually tapering from convex base, slightly waisted. Anterior sclerite of tegumen triangular with keyhole-shaped medial anterior emargination. Vinculum broadly rounded. Valve long and extremely narrow, distally falcate, extreme tip very narrowly rounded and posterior margin deeply excised before it; clasper less than half valve length from base. Juxta with rectangular lateral sclerites, each bearing broadly triangular, blunted dorsal process, and long, slender, upturned ventral process; anellus (Fig. 174) with large, slightly sinuate, lateral sclerites bearing large anteriorly directed spines, anterolateral edge medially protruded, bearing long, more erect spines. Aedeagus base broadly rounded; ductus ejaculatorius subbasal. Cornuti: basal dorsolateral clusters of slightly unequal length, left one shorter than, but extending distad of, right.

Genitalia ♀ (Figs 227, 273). In general as for *V. griseata*, see Remarks. Posterior sclerite of ostial chamber denticulate on lateral portions.

Remarks. The almost square white medial fascia on the upperside of the fore wing makes this species quite distinct. Of the known males of this group, *V. talboti* has the most narrowly falcate valve. The ♀ genitalia resemble those of *V. griseata* and *V. nobilis*, differing only slightly; posterior apophysis slightly curved, thicker than in *V. griseata* and terminally truncated as in *V. nobilis*; anterior apophysis similar, differing from other species by being medially angled near base; lateral bullae on posterior sclerite smaller than in *V. griseata* but larger than in *V. nobilis*, differing also from both in that the inner margins are nearly parallel and touching; posteriorly widened ductus bursae smaller than in *V. griseata* and more nearly square, larger than in *V. nobilis;* ductus bursae and corpus bursae smaller than in *V. griseata* and *V. nobilis*; signa smaller than in *V. griseata* but larger than in *V. nobilis*.

Biology. Early stages and host-plant unknown. Moths collected between October and December.

Distribution (Fig. 4). Moluccas: Seram.

Material examined

Paralectotypes. 1 ♂, 2 ♀, data as lectotype (1 ♀, abdomen missing; genitalia slide no.'s 14676/b, Shaffer, 14676; TM, Pretoria; BMNH) [1 ♀ syntype not seen].

Vitessa nobilis sp. n.

(Figs 4, 57, 228, 274)

♂. Unknown.

♀. 58 mm. Frons and vertex orange. Eye and ocellus brown. Chaetosema with pale yellowish setae. Antenna black, posterior surface of apical third of shaft white. Labial palpus [missing since time of description] black, first and second segments with considerable orange scaling basally and ventrally; third segment black, nearly as long as second. Maxillary palpus orange. Proboscis with black basal scaling. Neck region orange. Thorax above: orange; patagium black, laterally orange; tegula: black extending whole length, laterally orange. Abdomen above: black with grey terminal line on each segment, anal tuft orange. Body below: black; pectus black admixed with orange; abdomen black with wider grey terminal

lines on segments than above; anal tuft orange; legs black, whitish grey scaling on coxae, ventral surfaces of femora, tip of hind tibia. Fore wing above: black with metallic blue reflections; orange basal area completely divided, leaving minute basal area with larger subbasal area reaching *Cu*; costal area black from apex to base; wing veins bordered with greenish grey; medial fascia represented by a slightly post-medial, oblong, greenish grey patch on discocellular vein, and a diffuse bilobed greenish grey patch at middle of posterior margin; fringe black, with pale terminal scaling at tornus. Hind wing above: dull black with faint metallic reflections; fringe whitish grey, black at anal margin. Fore wing below: dull black with large, trapezoidal, whitish medial fascia; short whitish streak extending basally along *R* from anterolateral corner of fascia; faint traces of white vein-lines at apex; fringe as on upperside. Hind wing below: dull black; whitish grey vein-lines at apex; small greenish grey dash at angle of discocellular vein; fringe as on upperside.

Genitalia ♀ (Figs 228, 274). In general as for *V. griseata*, see Remarks. Posterior sclerite of ostial chamber (Fig. 274) coarsely denticulate on lateral portions.

Remarks. This species occurs sympatrically with *V. zemire* in Ambon. The fore wing is broader than in other species of the species-group; the upperside markings are completely distinct from those of all other species of *Vitessa*. The ♀ genitalia resemble those of *V. griseata* and *V. talboti*, but differ in the following characters: the posterior apophysis is thick and truncated as in *V. talboti* but straight; the anterior apophysis is long, slightly curved, thicker than in *V. griseata*, without basal angle as in *V. talboti*; the inner margins of the lateral bullae on the posterior wall of the ostial chamber diverge posteriorly, and do not converge medially as in *V. griseata*, or run parallel as in *V. talboti*; the anterior margin of the anterior sternite is recurved and deeply wrinkled as in *V. griseata*, more strongly wrinkled than in *V. talboti*; the ductus bursae is posteriorly widened and funnel-shaped as in *V. griseata* but narrower, not square as in *V. talboti*; the signa in the corpus bursae are smaller than in *V. griseata* or *V. talboti*.

Biology. Early stages and host-plant unknown. Holotype collected in November.

Distribution (Fig. 4). Moluccas: Ambon.

Material examined
Holotype ♀, **Moluccas:** Ambon, Mt Salohotus, no. 17844, xi.1923 (*C. J. Brooks*) (genitalia slide no. 14697; BMNH).

The *zemire*-group

Diagnosis. Hind wing above: black, as in *griseata*-group, but fore wing above with two transverse whitish fasciae on blackish ground colour, in addition to orange basal or subbasal patch and pale terminal vein-lines. ♂ genitalia with uncus slender or broadly flattened, decurved, with weakly differentiated distal portion bearing laterally directed setae; anellus with large lateral clusters of spines as in *griseata*-group; valve distally rounded or truncate, not falcate, fluted with oblique striations and mostly without clasper. ♀ genitalia more variable, with well-developed lateral, sclerotized, pouch-like invaginations beside ostial chamber, or twin bullae on posterior sclerite as in *griseata*-group; anterior margin of anterior sclerite strongly wrinkled; anteriorly extended antrum with conical or broadly flattened sclerotization, or antrum greatly reduced; corpus bursae with two round, depressed denticulate signa.

Remarks. Within the *zemire*-group there are three subgroups: (1) *V. cyanea*, with ♂ genitalia like those of *V. zemire* and with ♀ genitalia similar to those of the *griseata*-group; (2) *V. zemire*, with valve in ♂ not bearing a clasper and with ♀ genitalia having the distinctive long flattened antrum; (3) *V. vitialis* and *V. tamsi*, where the ♂ has a long club-shaped clasper on a valve otherwise similar to that of *V. zemire*, and where the sclerotized antrum of the ♀ genitalia is greatly reduced or lacking.

Vitessa cyanea Hampson, 1906
(Figs 12, 34, 58–61, 140, 141, 175, 176, 205, 206, 229, 230, 275, 276)

Vitessa cyanea Hampson, 1906 : 217.

♂, ♀. 38–46 mm. Frons and vertex orange. Eye fuscous. Ocellus well developed, brown. Chaetosema with pale yellowish setae. Antenna black, some orange scaling at base of scape: posterior surface of apical

third in ♂ with some dark grey scaling. Labial palpus with first and second segments orange, second segment black dorsally, lightly admixed with orange; third segment black with some orange at base. Maxillary palpus orange with ventral black spot, some black scales admixed terminally. Basal scaling of proboscis black, lightly admixed with orange at extreme base. Neck region orange. Thorax above: orange; patagium orange with posteromedial blue-black spot; tegula orange with an anterolateral blue-black spot. Abdomen above: blue-black; terminal margins of most segments finely edged with white, broader laterally, last segment with terminal margin orange, acuminately blue-black at centre. Body below and laterally: blue-black; pectus orange; terminal margins of abdominal segments broadly white; last segment with terminal margin completely orange. Legs blue-black; base of fore coxa black, broadly bordered with orange; light grey scaling at base of fore femur and ventral surface of fore tibia with reddish white scaling on ventral surface of epiphysis. Fore wing rather narrow; above with basal area orange, strongly indented at regions of A_1 and A_2, outer margin broadly curved, not reaching costa; single subbasal spot blue-black; subbasal, medial and terminal areas blue-black; creamy white antemedial fascia very narrow, sometimes incomplete, erect, not reaching costa or posterior margin, reduced to shorter hair-line in ♀; creamy white postmedial fascia large, oval, obliquely placed at end of cell, terminally extending into weak white terminal lines; fringe dark grey. Hind wing above: black with weak violaceous reflections; fringe dark grey apically, white towards anal margin, anal margin black. Fore wing below: black with violaceous reflections; postmedial fascia of similar proportions to that of upperside but without apical diffusion, diffusion stronger medially; posterior margin basally orange brown, medially white; fringe dark grey. Hind wing below: black with violaceous reflections; large white apical patch diffusing slightly along costa; fringe terminally white, anal margin black.

Genitalia ♂ (Figs 34, 140, 141, 175, 176). Uncus slender, abruptly tapering from convex base, distal portion down-curved, then up-curved, with sparse scattering of long, laterally directed setae. Gnathos with flattened, medially angled, wide lateral arms and with compressed, basally straight, gently upturned and finely acuminate process. Transtilla V-shaped, medially broadened or narrowed. Tegumen with posterior sclerite short, wide; anterior sclerite with keyhole-shaped medial anterior emargination. Vinculum ventrally narrow, broadly rounded posteriorly. Valve long, widest at centre, distally finely or broadly truncated; costa basally inflated; many fine oblique striations on mesal surface, slightly stronger striations towards posterior margin. Juxta with two lateral sclerites, each bearing a dorsal bluntly triangular process, deeply recurved and sparsely setose, supporting base of anellus, and a ventral, posteriorly directed, slender, sinuate and acuminate process, tip nearly reaching mid line; anellus (Figs 175, 176) arising from dorsal processes of juxta, large lateral sclerites, anteromedially directed, bearing large anteriorly directed spines; on dorsal surface of anellus between anterior ends of lateral sclerites, an elongated, oval, medial catena (Fig. 34), consisting of a cluster of minute posteriorly directed spines; remainder of anellus just reaching medial catena, minutely spinose; manica supported by lightly sclerotized elongated bands continuous with lateral sclerites of anellus, narrowing towards tip. Aedeagus of moderate length, expanded distally, slightly curved, base narrowly rounded; ductus ejaculatorius subbasal; scale-like spines extending dorsally and ventrally for a short distance onto aedeagus from vesica; base of vesica bulbous ventrally at distal end of aedeagus; dorsal and ventral surfaces covered with scale-like spines from base of vesica to halfway along dorsolateral clusters of cornuti, the spinose areas longitudinally rugose. Two large basal lateral cornuti clusters of equal length, the left placed a little distad of the right; oblique posterior ventromedial cluster reduced to sclerotized bases (Figs 205, 206).

Genitalia ♀ (Figs 229, 230, 275, 276). High, wide ovipositor lobes, dorsally fused and prolonged posteriorly, densely setose, setae longer on margin; spiny setae not easily seen. Posterior apophysis thick, curved, distally blunt and enlarged. Anterior apophysis thick, slightly curved, widened near base, distally blunt and enlarged. Posterior sclerite of ostial chamber (Figs 275, 276) broadly sclerotized, anteromedially broadly divided by a narrow sulcus, laterally a pair of wrinkled denticulate bullae with rounded, posteriorly converging inner margins. Anterior sclerite narrow, wrinkled, denticulate and reflected. Antrum short, wide. Ductus bursae membranous, posteriorly widened and flattened. Corpus bursae oval, membranous, with pair of large, heavily sclerotized, depressed, denticulate signa.

Remarks. This species resembles *V. zemire* in general appearance, but has narrower wings and slighter build. The postmedial fascia on the upperside of the fore wing is clearly connected to the white terminal lines. The ♂ genitalia are like those of *V. zemire* but differ in having the valve distally truncate, not narrowly rounded, and with a more pronounced ridge in normal position of clasper. The catena is reminiscent of that of the *griseata*-group. The ♀ genitalia most clearly resemble the *griseata*-group in the structure of the sclerites around the ostial chamber, in the development of the lateral bullae divided by a sulcus, and in the shape and size of the antrum.

The ♀ genitalia differ in important characters from those of *V. zemire*, the ostial sclerites and antrum being very different in shape.

We recognize two subspecies from the following geographical areas: (1) southern Moluccas; (2) eastern New Guinea.

BIOLOGY. Early stages and host-plants unknown. Moths collected from January to March, September to December.

DISTRIBUTION (Fig. 12). Southern Moluccas: Seram. New Guinea: Papua New Guinea. D'Entrecasteaux Islands: Fergusson Island.

Vitessa cyanea ceramensis subsp. n.
(Figs 12, 58, 59, 140, 175, 205, 229, 275)

♂, ♀. 38–46 mm. Generally as described for species. Fore wing above with white postmedial fascia broadly reaching main stem of *R* in ♂; in ♀ anteromedial corner of postmedial fascia protruded basally into cell. White antemedial fascia in ♀ narrow and complete but not reaching costa or posterior margin, diffuse medially.

GENITALIA ♂ (Figs 140, 175, 205). Generally as described for species. Uncus slender, gently tapering. Transtilla V-shaped and medially narrow. Valve widest a little beyond centre, distally finely truncated. Anellus (Fig. 175) with dorsal medial catena oval.

GENITALIA ♀ (Figs 229, 275). Generally as described for species, but see Remarks.

REMARKS. The specimens are externally in poor condition, especially the ♂. The fore wing above has the postmedial fascia broader than in the nominate subspecies and, in the ♀ at least, the antemedial fascia is broader. In the ♂ there is virtually no sign of the antemedial fascia or orange basal area, probably due to wear. The ♂ genitalia are distinguished from those of the nominate subspecies by the narrower uncus, somewhat narrower transtilla, broader valve with narrower apical truncation, shorter medial catena and shorter cornuti clusters. The ♀ genitalia are distinguished by the smaller, not distally enlarged apophyses, smaller bullae on the posterior ostial sclerite (Fig. 275), smaller corpus bursae and larger signa. The genital differences are considerable, and may prove to be of specific value.

BIOLOGY. Early stages and host-plant unknown. Allotype collected in December.

DISTRIBUTION (Fig. 12). Southern Moluccas: Seram.

MATERIAL EXAMINED

Holotype ♀, **Moluccas:** Seram ('Ceram'), 'Jllo', 1901 (*Coll. E. L. Ragonot*) (genitalia slide no. 15302/a, Shaffer; MNHN, Paris).

Paratype. **Moluccas:** 1 ♂ (allotype), Central Ceram, 29.20, 3000 ft [900 m], xii.1919 (*C. F. & J. Pratt*) (genitalia slide no. 15302/b, Shaffer; TM, Pretoria).

Vitessa cyanea cyanea Hampson, 1906
(Figs 12, 34, 60, 61, 141, 176, 206, 230, 276)

Vitessa cyanea Hampson, 1906, *Ann. Mag. nat. Hist.* (7) **17** : 217. Holotype ♂, D'ENTRECASTEAUX ISLANDS: Fergusson I., x.1894 (*Meek*) (BMNH) [examined].

♂, ♀. 40–46 mm. Generally as described for species. Fore wing above with white postmedial fascia narrowly reaching main stem of *R* veins in both sexes, medial margin broadly rounded. White antemedial fascia in ♀ and sometimes in ♂ reduced to a hair-line.

GENITALIA ♂ (Figs 34, 141, 176, 206). Generally as described for species. Transtilla medially broadened. Valve apex broadly truncated. Medial catena (Figs 34, 176) with additional smaller lateral patches.

GENITALIA ♀ (Figs 230, 276). As described for species.

REMARKS. The distinguishing features from *V. cyanea ceramensis* are given under that subspecies.

BIOLOGY. Early stages and host-plant unknown. Moths collected from January to March, September to December.

DISTRIBUTION (Fig. 12). New Guinea: Papua New Guinea. D'Entrecasteaux Islands: Fergusson Island.

MATERIAL EXAMINED

New Guinea: 8 ♂, Papua New Guinea, Hydrographer Mts, 750 m, i–iii.1918 (*Eichhorn Bros.*) (BMNH). **D'Entrecasteaux Islands:** 2 ♂, 1 ♀, Fergusson I., ix–xii.1894, xii.1914 (*Meek*) (BMNH).

Vitessa zemire (Stoll, [1781])

(Figs 5–9, 26, 62–77, 142–148, 177–182, 207, 208, 231–238, 277–284, 317)

Phalaena zemire Stoll, [1781] : 149, pl. 367, fig. 1.

♂, ♀. 37–62 mm. Frons and vertex orange. Eye and ocellus fuscous. Chaetosema with pale yellowish setae. Antenna black; anterior surface of scape orange; posterior surface of apical third of shaft white to variable extent; terminal segments sometimes black. First and second segments of labial palpus either with ventral and lateral surfaces orange, dorsal surfaces black, or completely orange; third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis black, admixed with orange at extreme base. Neck region orange. Thorax above: orange; patagium with large, posteromedial, metallic blue-black spot; tegula orange, with anterolateral metallic blue-black spot varying in length. Abdomen above: matt black, a narrow whitish grey terminal line on most segments, posterior half of terminal segment and anal tuft orange. Body below and laterally: blue-black; pectus orange; whitish grey abdominal lines wider than above; posterior half of terminal segment and anal tuft orange. Legs black; tibiae with metallic green reflections; variable amounts of whitish grey on some parts; anterior end of upper surface of hind tibia with long black scales. Fore wing rather wide; above: basal area orange, outer margin straight, slightly sinuate to greatly indented at *A*, oblique, bearing small black subbasal spot; ground colour black with metallic blue or green reflections; subbasal fascia variable in width, glossy blue-black; white or greenish white, parallel, somewhat oblique, antemedial and postmedial transverse fasciae of variable width, sometimes irregularly extended towards each other, rarely joining, the postmedial fascia always the broader; whitish vein-lines in terminal and apical regions; fringe fuscous with bronze gloss at intervals. Hind wing above: black with violaceous reflections; fringe glossy fuscous, whitish grey towards anal margin. Fore wing below: blue-black; single white postmedial fascia present, of variable width; posterior margin basally orange brown, medially white; retinaculum dark grey. Hind wing below: blue black; variable amount of white in apical region, either solid or consisting of wide bars on veins; sometimes a white discal spot present; fringe wholly grey or white.

GENITALIA ♂ (Figs 26, 142–148, 177–182, 207, 208). Uncus slender, gradually tapering, distal portion down-turned then up-turned, with sparse scattering of long, laterally directed setae. Gnathos with flattened, medially angled, wide lateral arms and with compressed, basally straight, but dorsoventrally widened, up-turned and sickle-shaped, acuminate medial process. Transtilla shallowly V-shaped and medially narrowed or of even width. Tegumen with posterior sclerite short and wide, anterior sclerite widely emarginated medially. Vinculum ventrally broad and basally convex. Valve long, widest at centre, distally tapering to a narrowly rounded apex; costa inflated; some oblique striations on ventral surface, clasper absent. Juxta with lateral sclerites chelate, each bearing a dorsal, bluntly triangular and thickly setose process and a ventral, slender, straight and acuminate process nearly reaching mid-line, supporting base of anellus. Anellus (Figs 177–182) with large lateral sclerites, strongly angled medially, bearing large anteriorly directed spines, sclerite connected directly to dorsal process (Fig. 26); ventral surface of anellus above lateral sclerite longitudinally rugose and lightly sclerotized, not spinose medially; medial catena absent; manica supported by dorsal, sclerotized, caliper-shaped bands arising from lateral sclerites on anellus, narrowing and less sclerotized towards tip. Aedeagus of moderate length, slightly expanded distally, straight, base narrowly rounded; ductus ejaculatorius subbasal; vesica bulbous ventrally at distal end of aedeagus and transversely rugose; ventrally, longitudinally rugose between cornuti clusters; dorsally and ventrally covered with scale-like spines; slightly bulbous at distal end of cornuti. Cornuti (Figs 207, 208) grouped in two clusters of spines, the left cluster ventrolateral and much smaller than the dorsolateral right cluster, or sometimes completely absent. No ventral cluster of cornuti.

GENITALIA ♀ (Figs 231–238, 277–284, 317). Ovipositor lobes long, slender, dorsally fused; surface densely setose, margin with longer setae; spiny setae not easily seen (Fig. 317). Posterior apophysis with weak vertical bar and slender shaft, distally spatulate. Anterior apophysis slightly longer, thicker and curved, distally spatulate. Posterior ostial sclerite (Figs 277–284) sclerotized as a broad band, transversely wrinkled and finely denticulate, forming laterally a pair of shallow invaginations slightly intruded into the pouches of anterior sclerite, sclerite bearing faintly produced bullae meeting in mid-line. Anterior sclerite forming

laterally a pair of shallow, pouch-like invaginations, connected medially, posterior margin wrinkled and reflected. Antrum wide and long, slightly waisted, sclerotized, broadly rounded posteriorly, fitting between invaginations, heavily sclerotized laterally, forming rounded bars, anteriorly ending irregularly in widened ductus bursae. Ductus bursae funnel-shaped at base of antrum, remainder narrow, membranous and minutely spinose. Corpus bursae globular, membranous, with a pair of large, heavily sclerotized, depressed, denticulate signa.

Remarks. This species is most closely related to *V. vitialis* and *V. tamsi*, but does not occur sympatrically with these species, which are limited to Fiji and Samoa respectively. Differential characters are discussed under *V. vitialis* and *V. tamsi* (pp. 111, 112).

Individual populations of *V. zemire* vary in external colour and pattern, but the structural differences are slight. We recognize eight subspecies, from the following geographical areas: (1) northern Moluccas; (2) southern Moluccas; (3) Misoöl, Salawati, Waigeo, New Guinea, Kepulauan Aru and D'Entrecasteaux Islands; (4) Queensland; (5) Umboi Island; (6) New Britain New Hannover and presumably New Ireland; (7) Solomon Islands; and (8) New Hebrides. More material may show that additional subspecies should be distinguished in the Moluccas and eastern Melanesia.

Biology. Early stages and host-plants unknown. Moths collected by many collectors in all months of the year.

Distribution (Figs 5–9). Moluccas; New Guinea and its coastal islands; Kepulauan Aru; D'Entrecasteaux Islands; Queensland; Bismarck Archipelago; Solomon Islands and New Hebrides.

Vitessa zemire expansa subsp. n.
(Figs 5, 62, 63, 231, 277)

♂, ♀. 48–58 mm. Generally very similar to the nominate subspecies. Fore wing above: orange basal area large, distal margin slightly protruded, straight or slightly sinuate; subbasal spot distinct. Antemedial and postmedial fasciae creamy white; antemedial fascia very narrow, diffuse medially; postmedial fascia broad, diffuse medially at base, anteriorly rounded, not reaching costa, hardly or not reaching posterior margin, terminal margin of fascia curved. Vein-lines in terminal area not reaching postmedial fascia. Hind wing below with pale apical patch tending to break into bars along veins.

Genitalia ♂. Generally as described for species. Right lateral cornuti cluster of vesica long and narrow with well-developed spines; left lateral cornuti cluster much narrower, spines greatly reduced in size, largest posteriorly.

Genitalia ♀ (Figs 231, 277). As described for species.

Remarks. This subspecies is distinguished from *V. zemire zemire* by creamy white as opposed to chalky white fasciae; the antemedial fascia is slightly wider than in *V. zemire zemire*. The ♂ is known only from a single non-topotypic specimen and may therefore not be typical of the subspecies. The ♀ is like that of *V. zemire zemire* but larger and with larger orange basal area. In the ostial chamber of the genitalia (Fig. 277) the anterior margin of the posterior sclerite is broader than in *V. zemire zemire*, also the antrum is longer and broader, with a slight waist near anterior end. The subspecies is distinguished from others by the geographical range, wing markings and genital characters.

Biology. Early stages and host-plant unknown. Moths collected in May and August.

Distribution (Fig. 5). Northern Moluccas: Halmahera and Batjan.

Material examined

Holotype ♀, **Moluccas:** Halmahera ('Halmaheira'), Toeelo [Tobelo ?] (*Bought from E. Le Moult*) (BMNH).

Paratypes. **Moluccas:** 19 ♀, data as holotype (genitalia slide no.'s 14707, 14708, 15288; BMNH); 1 ♀, Halmahera (*Waterstradt*) (BMNH); 1 ♀, Halmahera, Dodinga, 1892 (*Doherty*) (BMNH).

Material excluded from paratype series. **Moluccas:** 1 ♂, 2 ♀, Batjan, v.1892, viii.1897 (*Doherty*) (BMNH); 1 ♀, Ins. Obi (*Bernst.*) (RNH, Leiden).

Vitessa zemire zemire (Stoll, [1781])
(Figs 5, 64, 65, 142, 232, 278, 317)

Phalaena zemire Stoll, [1781], *in* Cramer, *Papillons Exotiques*, **4** : 149, pl. 367, fig. I. Holotype ♂, Moluccas: Ambon ('Amboina') (type lost; at the time of description in the collection of the Prince of Orange). [Subspecies identified from coloured figure and locality.]
Cosmethis zemire ('Cramer'); Hübner, [1820] : 179; Janse, 1924 : 503.
Vitessa zemira ('Cramer'); Lederer, 1863 : 335, pl. 6, fig. 8; Pagenstecher, 1884 : 266, 314; 1888 : 184; Ragonot, 1891 : 110. [Incorrect subsequent spellings.]
Vitessa zemire ('Cramer'); Walker, 1864 : 220; Swinhoe, 1900 : 429; Rothschild, 1915 : 223.
Vitessa zalmira ('Cramer'); Hampson, 1896*b* : 503. [Incorrect subsequent spelling.]
Cosmethis zemire (Stoll); de Joannis, 1930 : 637.

♂, ♀. 37–56 mm. Generally as described for species. Fore wing above: orange basal area variable, outer margin straight, curved or indented at cell and A_1; subbasal spot distinct, or merging with ground colour when area indented. Antemedial and postmedial fasciae chalky white; antemedial fascia very narrow, sometimes incomplete; postmedial fascia broad, slightly diffuse medially at base, anteriorly rounded, not reaching costa, hardly or not reaching posterior margin, terminal margin curved. Vein-lines in terminal area reduced or obsolete, not reaching postmedial fascia. Hind wing below with pale apical patch tending to break into bars along veins.

Genitalia ♂ (Fig. 142). Generally as described for species, but see Remarks.

Genitalia ♀ (Figs 232, 278, 317). Generally as described for species, but see Remarks.

Remarks. Distinguished from *V. zemire expansa* by chalky white fasciae as opposed to creamy white fasciae. Antemedial fascia slightly narrower than in *V. zemire expansa*. The examined specimens are very variable and may include as yet unrecognized subspecies; they are generally smaller than *V. zemire expansa*. The only known ♂ is in poor external condition and has genitalia identical with those of *V. zemire expansa*, also known from only one ♂; in both specimens the genitalia are somewhat damaged. In the ♀ genitalia the anterior margin of the posterior ostial sclerite (Fig. 278) is narrower than in *V. zemire expansa*, also the antrum is shorter and narrower, with a slight waist in the mid region. The subspecies is distinguished from others by the geographical range, wing markings and genital characters.

Biology. Early stages and host-plant unknown. Moths collected in January and February.

Distribution (Fig. 5). Southern Moluccas: Seram, Ambon and Saparua.

Material examined
Moluccas: 1 ♀, Seram (*ex Felder coll.*) (BMNH); 1 ♀, Central Seram, Mansela [sic] [3°15′ S, 129°38′ E], 650 m, 1912 (*Stresemann*) (BMNH); 1 ♀, Seram, Wahaai (*Moens*) (RNH, Leiden); 1 ♀, Ambon (*ex Musaeo* Dr. Boisduval) (BMNH); 1 ♀, Ambon (*Doleschal*) (BMNH); 4 ♀, Ambon, ii.1892 (*Doherty*) (BMNH); 1 ♀, Ambon (*Wallace*) (UM, Oxford); 1 ♀, Saparua, Oeliasers, i.1892 (*exp. Martin*) (BMNH); 1 ♂, Saparua (*Fruhstorfer*) (BMNH); 1 ♀, no data (*ex Felder coll.*) (BMNH).

Vitessa zemire temerata Swinhoe, 1906 **stat. n.**
(Figs 6, 66, 67, 143, 177, 233, 279)

Vitessa zemira ('Cramer'); Pagenstecher, 1886 : 167, 188. [Partim; incorrect subsequent spelling.]
Vitessa temerata Swinhoe, 1906, *Ann. Mag. nat. Hist.* (7) **18** :413. LECTOTYPE ♂, New Guinea: Papua, Granville ['Port Moresby'] 1907–128 (genitalia slide no. 15289; BMNH), here designated [examined].
Vitessa zemira ('Cramer'); Kenrick, 1907 : 75. [Incorrect subsequent spelling.]
Cosmethis temerata (Swinhoe); Janse, 1928 : 88.

♂, ♀. 38–62 mm. Generally as described for species. Fore wing above with orange basal area slightly variable, large, distal margin straight or curved; subbasal spot distinct. Antemedial and postmedial fasciae creamy white; antemedial fascia as wide as or wider than glossy blue-black subbasal fascia, medially diffuse; postmedial fascia very wide, width more than half length of fascia, slightly diffuse medially, distal margin sinuate, fascia truncate, short of costa but reaching posterior margin. Vein-lines in terminal area not reaching postmedial fascia. Hind wing below with pale apical patch tending to break into bars along veins but solid till past M_1.

GENITALIA ♂ (Figs 143, 177). Generally as described for species, but see Remarks.

GENITALIA ♀ (Figs 233, 279). Generally as described for species, but see Remarks.

REMARKS. This is distinguished from all other subspecies of *V. zemire* by the very broad, sharply defined postmedial fascia and fairly wide antemedial fascia, being closest in appearance to *V. zemire expansa* and *V. zemire zemire;* the subspecies *nephritica* from Queensland has equally broad fasciae but is distinguished by the diffusion of both into the medial region. In the ♂ genitalia the cornuti clusters are larger than in previous subspecies, the left cluster has much reduced, almost obsolete spines for most of posterior length. The ♀ genitalia are almost identical to those of previous subspecies, but most closely resemble those of *V. zemire expansa* in the shape of the antrum (Fig. 279), though in the present subspecies the antrum is shorter.

BIOLOGY. Early stages and host-plant unknown. Moths collected by many collectors in all months of the year.

DISTRIBUTION (Fig. 6). Misoöl; Salawati; Waigeo; New Guinea; Kepulauan Aru; D'Entrecasteaux Islands.

MATERIAL EXAMINED

Paralectotypes. **New Guinea:** 1 ♂, 2 ♀, labelled 6846, otherwise data as lectotype (genitalia slide no. 15290; BMNH); 11 ♂, 14 ♀, Mount Kebea, 1100 m ('3600 ft'), vi–viii.1903 (*A. E. Pratt*) (BMNH).

Misoöl: 5 ♂, Mysol, foot-hills, 30–150 m, wet season, x–xi.1916 (*Frost*) (BMNH); 1 ♀, central Mysol, bush country, about 60 m, wet season, x.1916 (*Frost*) (BMNH); 1 ♀, Misol, i.1899 (*Kühn*) (BMNH). **Salawati:** 1 ♂, (*Bernst*) (RNH, Leiden); 1 ♂, Salvati [Salawati ?], 1875 (*Bruijn*) (BMNH). **Waigeo:** 1 ♂, 2 ♀, Waigeu (*Waterstradt*) (BMNH); 1 ♂, Waigeoe, 1875 (*Bruijn*) (BMNH); 2 ♂, 5 ♀, Waigeu, Camp Nok, 750 m, v.1938 (*Cheesman*) (BMNH). **New Guinea:** 2 ♀, Irian Jaya, Mamberamo, Pionierbivak, vii.1920 (*Heurn*) (RNH, Leiden); 4 ♂, I. J., Sorong, 1875 (*Bruijn*) (BMNH); 2 ♀, I. J., Dorey Bay, Andai (*Doherty*) (BMNH); 5 ♀, I. J., Arfak Mts, 1200 m, ii–iii.1909 (*C. B. Pratt*) (CMAG, Birmingham); 4 ♀, I. J., central Arfak Mts, Ninay Valley, 1050 m, xi.1908–i.1909 (*Pratt*) (BMNH); 1 ♀, I. J., Arfak Peninsula, Momi Coast (= Wariab), ii.1928 (*Mayr*) (BMNH); 2 ♂, 6 ♀, I. J., Kapaur, low country, xii.1896–i.1897 (*Doherty*) (BMNH); 1 ♀, I. J., Kapaur (*Doherty*) (MM, Manchester); 1 ♀, I. J., River Tor (mouth), 4 km E. of Hol[andia], Maffen, vii.1959 (*Maa*) (BPBM, Honolulu); 1 ♂, I. J., Wandammen Mts, 900–1200 m, xi.1914 (*A. C. & F. Pratt*) (TM, Pretoria); 1 ♀, I. J., Geelvink B[a]y, Nomnagihé, 600 m, i–ii.1921 (*Pratt*) (TM, Pretoria); 2 ♂, 2 ♀, I. J., Nomnagihé, 15·33 km south of Wangaar, 600 m, i–ii.1921 (*C., F. & J. Pratt*) (TM, Pretoria); 1 ♀, I. J., Etna Bay, viii.1896 [3°58′ S, 134°47′ E] (*Kühn*) (BMNH); 4 ♂, 4 ♀, I. J., Snow Mts, nr Oetakwa R., 1050 m, x–xii.1910 (*Meek*) (BMNH); 1 ♀, I. J., Utakwa ['Oetakwa'] R., 750–900 m, ii.1913 (*Wollaston*) (BMNH); 1 ♂, 3 ♀, I. J., Snow Mts, Upper Setakwa R., 600–900 m, viii–ix.1910 (*Meek*) (BMNH); 1 ♀, I. J., Mt Goliath, 1500 m, about 139° Long. [4°40′ S, 139°52′ E], iii.1911 (*Meek*) (BMNH); 1 ♂, 1 ♀, I. J., Cyclops Mts, Sabron, Camp 2, 600 m, vii.1936 (*Cheesman*) (BMNH); 1 ♀, I. J., Humboldt Bay, ix–x.1892 (*Doherty*) (BMNH); 1 ♂, I. J., Humboldt Bay Dist., Uskwar, v.1937 (*Stüber*) (BMNH); 1 ♂, Papua New Guinea, Humboldt Bay Dist., Wembi, vii.1937 (*Stüber*) (BMNH); 1 ♀, P. N. G., Njau-limon, vi. 1937 (*Stüber*) (BMNH); 1 ♀, P. N. G., Torricelli Mts, Sea Falls between Afua & Chinapelli villages, iv.1939 (*Moore*) (BMNH); 2 ♀, P. N. G., Torricelli Mts, Mokai, 800 m, xii.1958 (*Brandt*) (ANIC, Canberra); 1 ♂, 1 ♀, P. N. G., Sepik Dist., Bainyik, 300 m, x.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., Sepik Dist., Angoram, 6 m, 1959 (*Brandt & Hallstrom*) (ANIC, Canberra); 1 ♀, P. N. G., Telefomin, 1350–1700 m, vi–ix.1959 (*Brandt*) (ANIC, Canberra); 8 ♀, P. N. G., Astrolabe Bay, iii–x (*Wahnes*) (BMNH); 1 ♀, P. N. G., Finisterre Range, Kiambavi, 1350 m, vi–vii.1958 (*Brandt*) (ANIC, Canberra); 1 ♀, P. N. G., Finisterre Mts, Wantoat, 1200 m, ix.1957 (*Munroe & Holland*) (CNC, Ottawa); 3 ♂, 4 ♀, P. N. G., Mount Kebea, 1100 m, vi–viii.1903 (*A. E. Pratt*) (BMNH; CMAG, Birmingham); 2 ♀, P. N. G., Aroa R., Booboomie, 600 m, v.1905 (*Meek*) (BMNH); 6 ♀, P. N. G., Aroa R. (*Meek*) (BMNH); 3 ♂, 3 ♀, P. N. G., Lower Aroa R., xi.1904–iii.1905 (*Meek*) (BMNH); 2 ♀, P. N. G., Upper Aroa R., iii.1903 (*Meek*) (BMNH); 7 ♂, 7 ♀, P. N. G., Babooni, 900–1100 m, vii–ix.1903 (*A. E. Pratt*) (BMNH; CMAG, Birmingham); 1 ♀, P. N. G., Ekeikei, 450 m, iii–iv.1903 (*Pratt*) (BMNH); 2 ♂, 1 ♀, P. N. G., Foula, 1350 m, viii.1903 (*Pratt*) (BMNH); 1 ♀, P. N. G., St Joseph R. [8°56′ S, 147°20′ E] (*Weiske*) (BMNH); 1 ♀, P. N. G., Brown R. (*Weiske*) (BMNH); 4 ♂, 6 ♀, P. N. G., Sogeri Plateau, Bisianumu, 500 m, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 5 ♂, 11 ♀, P. N. G., Sogeri Plateau, Mageri, 500 m, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., Central Dist., Subitana, 550 m, i.1949 (*Brandt & Hallstrom*) (ANIC, Canberra); 2 ♂, 2 ♀, P. N. G., Mambare R., Biagi, 1500 m, i–iii.1906 (*Meek*) (BMNH); 3 ♂, 6 ♀, P. N. G., Hydrographer Mts, 750 m, i–iii.1918 (*Eichhorn*

Bros.) (BMNH); 1 ♀, P. N. G., Collingwood Bay, Haidana (*Meek*) (BMNH); 2 ♂, 2 ♀, P. N. G., Amazon Bay area, Doveta, 750 m, vii–ix.1962 (*Brandt*) (ANIC, Canberra); 1 ♂, 13 ♀, P. N. G., Milne Bay, xii.1898–ii.1899 (*Meek*) (BMNH; NMNH, Washington); 2 ♀, P. N. G., Sariba I. (*Meek*) (BMNH); 1 ♀, no data (*Barnett*) (BMNH); 1 ♀, no data (*Joicey coll.*) (BMNH); 2 ♀, no data (*Rosenberg*) (RSM, Edinburgh); 2 ♀, no data (*Walsh*) (RNH, Leiden); 2 ♀, no data (BMNH); 1 ♀, no data (UM, Oxford). **Kepulauan Aru:** 1 ♂, Aroe [Aru] (*Kühn*) (BMNH); 1 ♂, Ureiuning (BMNH); 1 ♀, Dobbo (Dobo), 1897 (*Doherty*) (BMNH). **D'Entrecasteaux Islands:** 3 ♀, Fergusson I., xii.1894–xii.1895 (*Meek*) (BMNH).

Vitessa zemire nephritica subsp. n.

(Figs 6, 26, 68, 69, 144, 178, 234, 280)

♂, ♀. 43–56 mm. Generally as described for species. Fore wing above with orange basal area large, outer margin finely protruded at costa, mid-line and posterior margin; subbasal spot distinct. Antemedial and postmedial fasciae pale jade green; antemedial fascia broad, diffuse medially and at points meeting diffusion from very broad postmedial fascia; postmedial fascia finely separated from costa but reaching posterior margin, terminal margin sinuate. Vein-lines in terminal area strongly developed and at some points faintly joining postmedial fascia. Hind wing below with pale apical patch tending to break into bars along veins, but solid till past M_1, faintly extended down to Cu_2.

Genitalia ♂ (Figs 26, 144, 178). Generally as described for species, but see Remarks.

Genitalia ♀ (Figs 234, 280). Generally as described for species, but see Remarks.

Remarks. This is distinguished from all other subspecies of *V. zemire* by the very broad fasciae, which diffuse medially and join in places. The jade green coloration is striking in fresh material, but is faded in old specimens. In the ♂ genitalia the right cornuti cluster is slightly shorter than in *V. zemire temerata*, the left cornuti cluster is greatly reduced in length, its anterior spines being nearly obsolete, mostly represented only by sclerotized bases. The ♀ genitalia have the antrum (Fig. 280) slightly narrower than in *V. zemire temerata*, its sides more nearly parallel but the lateral areas much less heavily sclerotized, and the anterior waist hardly accentuated. The signa are smaller than in all previous subspecies.

Biology. Early stages and host-plant unknown. Moths collected from March to May.

Distribution (Fig. 6). Australia: Queensland.

Material examined

Holotype ♂, **Australia:** Queensland, Mt Edith, 18 mls [29 km] north-east of Atherton, 3400 ft [1050 m], 18.iii.1964 (*Common & Upton*) (ANIC, Canberra).

Paratypes. **Australia:** 1 ♀ (allotype), Queensland, 27 km ('17 mls') south of Atherton, 900 m ('3000 ft'), 19.iii.1964 (*Common & Upton*) (ANIC, Canberra); 5 ♂, 2 ♀, Q., 18 km ('11 mls') south of Ravenshoe, 800 m ('2700 ft'), iii.1964 (*Common & Upton*) (ANIC, Canberra; CNC, Ottawa); 1 ♂, Q., Mt Bartle Frere, East Base [17°27′ S, 145°53′ E], 24 m ('80 ft'), iii.1955 (*Common*) (ANIC, Canberra); 1 ♀, Q., L. Barrine [17°16′ S, 145°38′ E], v.1939 (ANIC, Canberra); 5 ♂, 8 ♀, Q., Atherton Tableland, Millaa Millaa, 750 m ('2500 ft'), iv.1932 (*Darlington*) (Genitalia slide no.'s DK 69, DK 70; MCZ, Cambridge, Mass.; CNC, Ottawa); 1 ♂, 2 ♀, Q., Kuranda, n. Cairns, 1910 (*Dodd*) (Genitalia slide no.'s 15291, 15292; BMNH); 1 ♀, same locality, 26.v.[19]02 (*F.T.*) (ANIC, Canberra); 1 ♀, Q., Atherton (ANIC, Canberra); 1 ♂, Q., 5 km ('3 mls') west of Mossman, 4.iii.[19]64 (*Common & Upton*) (ANIC, Canberra); 1 ♂, Q., Palmerston National Park, on Tully-Cairns Power Line, at light, in rain forest, 6.xi.1966 (*Britton*) (ANIC, Canberra); 1 ♀, Q., 14 km ('9 mls') west of Kennedy, 610 m ('2000 ft'), 17.iv.1969 (*Common & Upton*) (ANIC, Canberra); 1 ♂, no data (MNHN, Paris).

Vitessa zemire coronis subsp. n.

(Figs 7, 70, 71, 145, 179, 207, 235, 281)

♂, ♀. 44–58 mm. Generally as described for species. Fore wing above with orange basal area large, outer margin straight, slightly produced distad in ♂ at posterior margin, in ♀ broadly produced at base of cell; subbasal spot distinct. Antemedial and postmedial fasciae narrow, variable; antemedial fascia narrower than postmedial, greenish white, slightly diffuse medially; postmedial fascia creamy white, generally widest in mid region, anteriorly rounded, not reaching costa, posteriorly with slight diffusion medially, not

reaching posterior margin, outer margin in ♂ rounded, in ♀ broadly indented between M_1 and M_2. Vein-lines in terminal area of ♂ extending back to Cu_1, well separated from postmedial fascia; in ♀ far less strongly developed. Hind wing below with pale apical patch tending to break into bars along veins.

GENITALIA ♂ (Figs 145, 179, 207). Generally as described for species, but see Remarks.

GENITALIA ♀ (Figs 235, 281). Generally as described for species, but see Remarks.

REMARKS. This is distinguished from previous subspecies by the much narrower white fasciae; from *V. zemire novaebritanniae* by the generally broader white fasciae and a more distinct subbasal spot in the orange basal area; from remaining subspecies by not having the orange basal area indented, by having white apical markings on the underside of the hind wing and lacking the white spot over the cell. In the ♂ genitalia the right cornuti cluster (Fig. 207) is relatively longer than in previous subspecies, the left cornuti cluster is just as long, but has the spines developed only on the posterior half; on the anterior half they are reduced to sclerotized bases. In the ♀ genitalia the antrum (Fig. 281) is longer than in *V. zemire nephritica* and laterally more heavily sclerotized; it is broadest at posterior end, with a slight waist anteriorly. The corpus bursae has the signa larger than in *V. zemire nephritica*.

BIOLOGY. Early stages and host-plant unknown. Moths collected in July and August.

DISTRIBUTION (Fig. 7). Bismarck Archipelago: Umboi Island.

MATERIAL EXAMINED

Holotype ♂, **Bismarck Archipelago:** Rook[e] Island, viii.1913 (*Meek*) (BMNH).

Paratypes. **Bismarck Archipelago:** 3 ♂, 2 ♀ (including allotype), vii–viii, data as holotype (genitalia slide no.'s 14716, 15137, 15293, 15294; BMNH).

Vitessa zemire novaebritanniae subsp. n.

(Figs 7, 72, 73, 146, 180, 236, 282)

♂, ♀. 40–54 mm. Generally as described for species. Fore wing above with orange basal area large, outer margin straight or variably sinuate; subbasal spot much reduced. Antemedial and postmedial fasciae very narrow, greenish white; antemedial fascia reduced to sometimes incomplete hair-line; postmedial fascia not reaching costa or posterior margin, posteriorly with slight diffusion medially, outer margin in both sexes broadly indented between M_1 and M_2. Vein-lines in terminal area of ♂ reaching down to M_3, well separated from postmedial fascia; far less developed in ♀. Hind wing below with pale apical markings breaking into bars along veins at least to R_5, sometimes as far as M_3.

GENITALIA ♂ (Figs 146, 180). Generally as described for species, but see Remarks.

GENITALIA ♀ (Figs 236, 282). Generally as described for species, but see Remarks.

REMARKS. This is distinguished from all other subspecies by the much narrower white fasciae. Among the subspecies having large, non-indented, orange basal areas, this subspecies shows greatest reduction in the size of the subbasal spot. Among the subspecies with white apical markings on the underside of the hind wing, these are the most reduced in this subspecies. Specimens from New Hannover tend to have the antemedial fascia and the subapical vein-streaks better developed, but are not always distinguishable. In the ♂ genitalia the right cornuti cluster is slightly smaller than in *V. zemire coronis*, the left cornuti cluster is shorter than the right, with short spines present on posterior quarter of cluster, the remainder reduced to sclerotized bases. In the ♀ genitalia the antrum (Fig. 282) is similar to that of *V. zemire coronis* but narrower posteriorly; the corpus bursae and signa are of the same size as in that subspecies.

BIOLOGY. Early stages and host-plant unknown. Moths collected from January to March.

DISTRIBUTION (Fig. 7). Bismarck Archipelago: New Britain; New Hannover; New Ireland.

MATERIAL EXAMINED

Holotype ♂, **Bismarck Archipelago:** New Britain, Talesea, i.1925 (*A. F. Eichhorn*) (genitalia slide no. 14632; BMNH).

Paratypes. **Bismarck Archipelago:** 3 ♂, 2 ♀ (including allotype), data as holotype (genitalia slide no.'s 14634, 15134, 15295, 15296; BMNH).

Material excluded from paratype series. **Bismarck Archipelago:** 10 ♂, 2 ♀, New Hannover, ii–iii.1923 (*Meek*) (BMNH; TM, Pretoria); 1 ♂, New Ireland, Schleinitz Mountains, 915 m ('3000 ft'), 2.x.–15.xii.1959 (*Brandt*) (ANIC, Canberra).

Vitessa zemire solomonis subsp. n.
(Figs 8, 74, 75, 147, 181, 237, 283)

♂, ♀. 46–58 mm. Generally as described for species. Fore wing above with orange basal area reduced, split at A_1 by V-shaped indentation from outer margin; subbasal spot large, sometimes joining costa. Antemedial and postmedial fasciae very narrow, creamy white; antemedial fascia narrow in ♂, slightly short of costa and posterior margin, in ♀ reduced to hair-line; postmedial fascia well short of costa and posterior margin, slightly diffuse medially, outer margin in both sexes slightly rounded. Vein-lines in terminal area in ♂ from between R_4 to Cu_1, in ♀ variable, from just a trace between R_4 and R_5 to lines reaching between Cu_2 and *CuP*; mostly separated from postmedial fascia. Hind wing below with pale apical marking reduced to faintest trace, but with white streak along costa from apex to about level with medial side of postmedial fascia of fore wing; small, triangular, oblique, white spot at apex of cell, commencing at and following lines of discocellular vein.

Genitalia ♂ (Figs 147, 181). Generally as described for species. Left cornuti cluster absent; right cornuti cluster short, crescent-shaped, spines longest at centre. See Remarks.

Genitalia ♀ (Figs 237, 283). Generally as described for species. Antrum laterally asymmetrical, right lateral margin concave, left lateral margin convex. See Remarks.

Remarks. This is distinguished from previous subspecies by having a white spot at the apex of cell on the underside of the hind wing; by lacking a definite apical marking but having a short white streak on the costa. On the upperside of the fore wing the deeply indented orange basal area is shared only by *V. zemire zemire*, from which the present subspecies is distinguished by the narrower postmedial fascia. *V. zemire solomonis* is distinguished from *V. zemire cheesmanae* by the slightly narrower postmedial fascia and by the predominant tendency for the terminal vein-lines on the upperside of the fore wing not to reach the postmedial fascia, the only exception seen being a ♀ from Guadalcanal Island. The ♂ genitalia are easily distinguished from those of the previous subspecies by the absence of the left cornuti cluster; the ♀ genitalia by the asymmetry of the antrum (Fig. 283), though this asymmetry is less accentuated than in *V. zemire cheesmanae*.

Biology. Early stages and host-plant unknown. Moths collected in January, February, April, June, November and December.

Distribution (Fig. 8). Solomon Islands: Bougainville Island to Guadalcanal Island.

Material examined

Holotype ♂, **Solomon Islands:** Florida I., i.1901 (*Meek*) (genitalia slide no. 15297; BMNH).

Paratypes. **Solomon Islands:** 2 ♀, Bougainville, iv.1904 (*Meek*) (BMNH); 1 ♀, north side of Choiseul I., xii.1903 (*Meek*) (BMNH); 3 ♀, Guizo I., xi.1903 (*Meek*) (genitalia slide no. 15135; BMNH); 1 ♀, Rendova, ii.1904 (*Meek*) (BMNH); 6 ♀ (including allotype), data as holotype (BMNH); 1 ♀, Tugela (*Woodford*) (genitalia slide no. 15298; BMNH); 1 ♀, Guadalcanal, Honiara, vi.1971 (*H. S. Robinson*) (BMNH).

Vitessa zemire cheesmanae subsp. n.
(Figs 9, 76, 77, 148, 182, 208, 238, 284)

♂, ♀. 48–52 mm. Generally as described for species and for *V. zemire solomonis*. Fore wing above with considerable green in the blue reflections of the dark ground colour. Orange basal area deeply indented, subbasal spot always separated from costa. White antemedial fascia narrow but complete, slightly diffuse medially. Postmedial fascia broad, not reaching costa or posterior margin, medially extended and slightly diffuse, terminal margin broadly rounded and sinuate. Vein-lines in terminal area extending back to Cu_2, separated from but close to postmedial fascia. Hind wing below with white costal streak and white marking on discocellular vein.

Genitalia ♂ (Figs 148, 182, 208). Generally as described for species. Left cornuti cluster greatly reduced to minute group of short spines and sclerotized spine-bases. Right cornuti cluster short, crescent-shaped, spines longest at centre. See Remarks.

GENITALIA ♀ (Figs 238, 284). Generally as described for species. Antrum (Fig. 284) laterally asymmetrical. See Remarks.

REMARKS. This is distinguished from *V. zemire solomonis* by the broader postmedial fascia and by the terminal white lines being closer to the postmedial fascia. It differs from all other subspecies of *V. zemire* by the presence of a white discocellular marking on the underside of the hind wing. In the ♂ genitalia this subspecies differs from *V. zemire solomonis* in the presence of a small left cornuti cluster (Fig. 208) consisting of sclerotized bases. The ♀ genitalia are distinguished by the more strongly asymmetrical, narrower and longer antrum (Fig. 284) and by the larger signa. This subspecies and *V. zemire solomonis* are somewhat atypical of the species, but the general similarity to other subspecies is so great that separate specific status is unwarranted. We take pleasure in dedicating this subspecies to Miss L. E. Cheesman, collector of the holotype, in recognition of her extensive contribution to the knowledge of Pacific entomology.

BIOLOGY. Early stages and host-plant unknown. Moths collected from March to May and in August. A specimen from Efate recorded as flying at 1600 h.

DISTRIBUTION (Fig. 9). New Hebrides.

MATERIAL EXAMINED

Holotype ♂, **New Hebrides:** Malekula, Ounua [Bay, 16°14′ S, 167°36′ E, nr Bansarik], iv–v.1929 (*Cheesman*) (genitalia slide no. 14630; BMNH).

Paratypes. **New Hebrides:** 1 ♀ (allotype), data as holotype (genitalia slide no. 14631; BMNH); 1 ♀, Efate, near Vila, Montmartre, flying 1600 h, 9.iii.1974 (*Maddison*) (genitalia slide no. 15299; BMNH); 6 ♂, 14 ♀, Espiritu Santo, south coast, Narango, v–vii.1960 (*Brandt*) (ANIC, Canberra; CNC, Ottawa); 2 ♂, Espiritu Santo I. (SW), above Namatasopa [15°31′ S, 166°49′ E] 400 m, viii.1957 (*Gressitt*) (BPBM, Honolulu); 1 ♂, [no exact locality] (*HMS Dart*) (BMNH).

Vitessa vitialis Hampson, 1906
(Figs 10, 78–80, 149, 183, 209, 239, 285)

Vitessa vitialis Hampson, 1906, *Ann. Mag. nat. Hist.* (7) **17** : 217. Holotype ♀, FIJI (*Crowley Bequest*) (genitalia slide no. 15300; BMNH) [examined].

♂, ♀. 54–60 mm. Frons smoothly scaled, glossy blue-black. Vertex with erect bushy orange scaling, extending forward between antennae. Eye and ocellus black. Chaetosema with orange setae. Antenna with pectinations in ♂ very short, black; dorsal scaling of antennal shaft glossy black, except basal half of apical third white. Labial palpus with first and second segments orange, third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis blue-black with violaceous reflections. Neck region orange. Thorax above: orange, with narrow, medial, longitudinal blue-black stripe; patagium glossy blue-black; tegula orange with anterolateral blue-black spot. Abdomen above: matt black, a narrow white terminal line on each segment, except last segment with posterior margin orange, anal tuft orange. Body below: glossy blue-black; pectus orange; white terminal lines on abdominal segments broader than above, last segment with posterior margin orange, anal tuft orange. Legs in ♂ with most parts of coxae, femora and tibiae covered with bushy orange scales, remaining parts dark fuscous; legs in ♀, glossy green-black, ventral surfaces of mid and hind femora white, tibiae white-tipped. Fore wing above: base blue-black with strong gloss; subbasal area orange, reaching *Cu*, short of costa, finely edged with weakly glossy blue-black; subbasal fascia blue-black with strong gloss; yellowish white antemedial fascia erect narrow, short of costa and posterior margin, finely diffuse medially; medial fascia blue-black; yellowish white postmedial fascia slightly oblique, pointing towards posterior margin well basad of tornus, narrow, widest at centre, medial and terminal margins irregular; terminal area blue-black, yellowish white vein-lines short of postmedial fascia; dark areas of wing with strong greenish hue; fringe basally dark grey, distally white, flecked with dark grey. Hind wing above blue-black with weak violaceous reflections, cubital and anal area covered with long black hairs; fringe basally dark grey, distally white flecked with dark grey. Fore wing below: blue-black, in ♂ with strong diffusion of orange at base, finely diffuse on costa and posterior margin; dark areas with violaceous reflections, weak greenish hue especially at costa; retinaculum dark grey; yellowish white postmedial fascia as above but more diffuse; vein-lines short, apical; fringe as above. Hind wing below as above, apical vein-lines fine; in ♂ basal and discal areas with orange suffusion, strongest on veins, especially discocellular vein; ♀ without orange suffusion but with minute patch of white scales on angle of discocellular.

GENITALIA ♂ (Figs 149, 183, 209). Uncus wide, depressed, concave ventrally like an inverted trough, decurved then upcurved to tip, bearing lateral setae for most of its length. Gnathos arms broadening medially, flattened medial process deep at base, acutely sickle-shaped, tip finely acuminate. Transtilla shallowly V-shaped, medially narrow. Tegumen with medially broadened narrow posterior sclerite; anterior sclerite medially upturned, with broad keyhole-shaped emargination. Vinculum wide, laterally broadened, base strongly concave. Valve long, very narrow, costa inflated at base, apex narrowly rounded; with narrow, central, longitudinal sclerotized band; mesal surface with long oblique striations; posterior margin heavily sclerotized, especially at broadened base; long curved club-shaped clasper at mid length of posterior margin, on widened oblique base, extending posteriorly at right angles then curving basad. Juxta wide; lateral sclerites broad, heavily sclerotized, each bearing short wide dorsal and ventral processes, posteromedially directed; anellus (Fig. 183) supported by dorsal juxta process, with large, lateral, anteromedially directed sclerites, bearing large anteriorly directed spines; manica supported by sclerotized bands continuous with lateral sclerites. Aedeagus long, distally widened, base narrowly rounded, ductus ejaculatorius subbasal; spines of vesica mainly basal, vesica ventrally bulbous at distal end of aedeagus and transversely rugose, vesica with ventrolateral left and dorsolateral right cornuti clusters (Fig. 209), longitudinally rugose dorsally between cornuti clusters; right cluster longer than left, with longer spines.

GENITALIA ♀ (Figs 239, 285). Ovipositor lobes dorsally fused, dorsally narrowly produced, densely setose, setae longer on margins; spiny setae not easily seen. Posterior apophysis long, straight, distally widening, spatulate at tip. Anterior apophysis longer, thicker, sinuate, with inwardly curved spatulate tip. Posterior ostial sclerite (Fig. 285) broad, heavily sclerotized, posterior margin with small V-shaped medial incision; small anteromedial bullae; sulcus wide, margins separated. Anterior margin of ostium mostly membranous, inner part weakly sclerotized, wrinkled, laterally minutely denticulate. Antrum short, weakly sclerotized, except for a small anteromedial sclerotized area. Ductus bursae irregularly swollen posteriorly; narrow anterior part minutely spined. Corpus bursae large, oval, membranous, with small, paired, heavily sclerotized, depressed, denticulate signa.

REMARKS. This species bears considerable resemblance to *V. zemire*, but otherwise it can be confused only with *V. tamsi* from Samoa. It differs from *V. zemire* in the markings of the fore wing; the orange area is subbasal, the white fasciae are distinctly yellowish, the very wide terminal area has almost equally long pale lines on most veins. The ♂ is unlike other species except *V. tamsi*, in the presence of massive orange scaling (androconia ?) on the femora and tibiae and unlike other species, including *V. tamsi*, with sex-limited orange scaling on the underside of the hind wing. The ♂ genitalia are unlike those of any other species except *V. tamsi*, which shares the wide, flattened uncus, the long narrow valve and the club-shaped clasper. In *V. vitialis* the transtilla is V-shaped, the clasper lacks a ridge from base, the juxta is narrower and the left cornuti cluster is larger than in *V. tamsi*. The ♀ genitalia are distinctive in the shape of the swollen posterior end of ductus bursae and in the much reduced antrum, but those of *V. tamsi* are almost identical (see Remarks under that species). There is some individual variation in external and genital characters. The two specimens from the Lau group, though worn, appear to have the postmedial fascia of the fore wing wider, but whether this is a significant difference remains to be seen. This is the only known species in the Fiji Islands.

BIOLOGY. Early stages and host-plant unknown. Moths collected in January, from June to October and in December.

DISTRIBUTION (Fig. 10). Fiji: Vanua Levu, Viti Levu and Lau Group.

MATERIAL EXAMINED

Fiji: 6 ♀, Vanua Levu, Navonu, Forest Area Niuvundi, ix.1975 (*Maddison*) (BMNH; KRS, Fiji); 1 ♀, Viti Levu, Vuni[n]dawa, vii.1932, caught in butter dish at tea (*Phillips*) (BMNH); 1 ♀, V. L., Nandarivatu, x.1937 (*Valentine*) (BPBM, Honolulu); 1 ♀, V. L., Nandarivatu, 800 m, ix.1955 (*Simmonds*) (BMNH); 1 ♀, V. L., Nandarivatu, vi.1968 (*H. S. Robinson*) (BMNH); 1 ♂, 1 ♀, V. L., Nandarivatu, ix.1974 (*G. S. Robinson*) (BMNH); 2 ♀, V. L., Savura Creek, 1966–67, i.1967 (*H. S. Robinson*) (BMNH); 1 ♀, V. L., Savura Creek, vii.1969 (*H. S. & G. S. Robinson*) (BMNH); 1 ♂, 1 ♀, V. L., Tholoisuva, xii.1958 (*Simmonds*) (BMNH); 1 ♀, V. L., Colo-i-suva, Malaise trap, iii.1963 (*Yoshimoto*) (BPBM, Honolulu); 1 ♀, V. L., Coloi Suva [Tholoisuva], viii.1968 (*H. S. & G. S. Robinson*) (BMNH); 1 ♀, V. L., Suva, vii.1954 (*Simmonds*) (BMNH); 1 ♂, Lau Group, Namuka [-i-Lau], xii.1924 (*Bryan*) (BPBM, Honolulu); 1 ♀, Ongea, viii.1924 (*Bryan*) (BPBM, Honolulu).

Vitessa tamsi sp. n.
(Figs 11, 42, 43, 81, 240, 286)

♂, ♀. 52–58 mm. In general as described for *V. vitialis*. Tegula orange with anterior blue-black spot. Thorax above: orange with wide, medial, longitudinal blue-black stripe. Fore wing above with yellowish white postmedial fascia, in ♀ half as wide as long, wider in ♂, medially rounded, not reaching costa or posterior margin, very oblique, pointing towards tornus; orange subbasal area narrow. Fore wing below: postmedial fascia as wide as above; antemedial fascia faintly indicated. Hind wing below: white spot on discocellular vein varying from a few scales to a spot over half width of cell. Wings of ♂ below like those of ♀, without orange scaling, and with white discocellular marking.

Fig. 42 *Vitessa tamsi* sp. n., ♂ allotype, Western Samoa.

GENITALIA ♂ (Fig. 43). In general as described for *V. vitialis*. Transtilla nearly straight. Genitalia damaged, valve tips missing. Club-shaped clasper with short, straight, raised ridge extending from base towards base of valve. Anterior portion of juxta very broad. Aedeagus with slightly reduced left cornuti cluster.

GENITALIA ♀ (Figs 240, 286). In general as described for *V. vitialis*. Posterior apophysis short, slightly sinuate, distally widening and spatulate at tip. Anterior apophysis short, thicker, straight, distally tapering, tip spatulate. Posterior ostial sclerite (Fig. 286) narrow, strongly sclerotized, posterior margin with small V-shaped medial incision; anterior margin broadly upturned medially, small anteromedial bullae, wide sulcus between, margins separated; sclerite slightly bulging laterally. Antrum sclerotization very weak, hardly visible.

REMARKS. This species is very closely related to *V. vitialis*, of which it is the Samoan vicariant. It is distinguished externally by the broader and more oblique postmedial fascia on the upperside of the fore wing pointing to the tornus, not to the posterior margin basad of the tornus as in *V. vitialis*, and by the slightly narrower orange subbasal area. The postmedial fascia is noticeably wider in the ♂ than in the ♀. The tegula bears an anterior blue-black spot rather than an antero-lateral spot as in *V. vitialis*. *V. tamsi* shares with *V. vitialis* the strong greenish hue over all dark areas on wings and legs. In the ♂ the underside of the wings lacks the extensive diffusion of orange scaling seen in the ♂ of *V. vitialis*. The ♂ genitalia differ from those of *V. vitialis* by the straighter transtilla, the short raised ridge extending from the base of the clasper, by the broader anterior portion of the juxta, and by the smaller left cornuti cluster of the vesica.

In the ♀ genitalia the posterior ostial sclerite is much narrower medially in *V. tamsi*, almost making two triangular areas. The antrum is hardly sclerotized, whereas in *V. vitialis* a small triangular sclerotized plate is present. The ductus bursae is longer than the bursa in *V. tamsi*, shorter in *V. vitialis*. These differences seem of specific rather than subspecific value. We take pleasure in dedicating this species to our esteemed colleague Mr W. H. T. Tams, in recognition of his contributions to the knowledge of the moths of Samoa.

BIOLOGY. Early stages and host-plant unknown. Moths collected in January, March and September.

DISTRIBUTION (Fig. 11). Western Samoa; so far known only from Upolu.

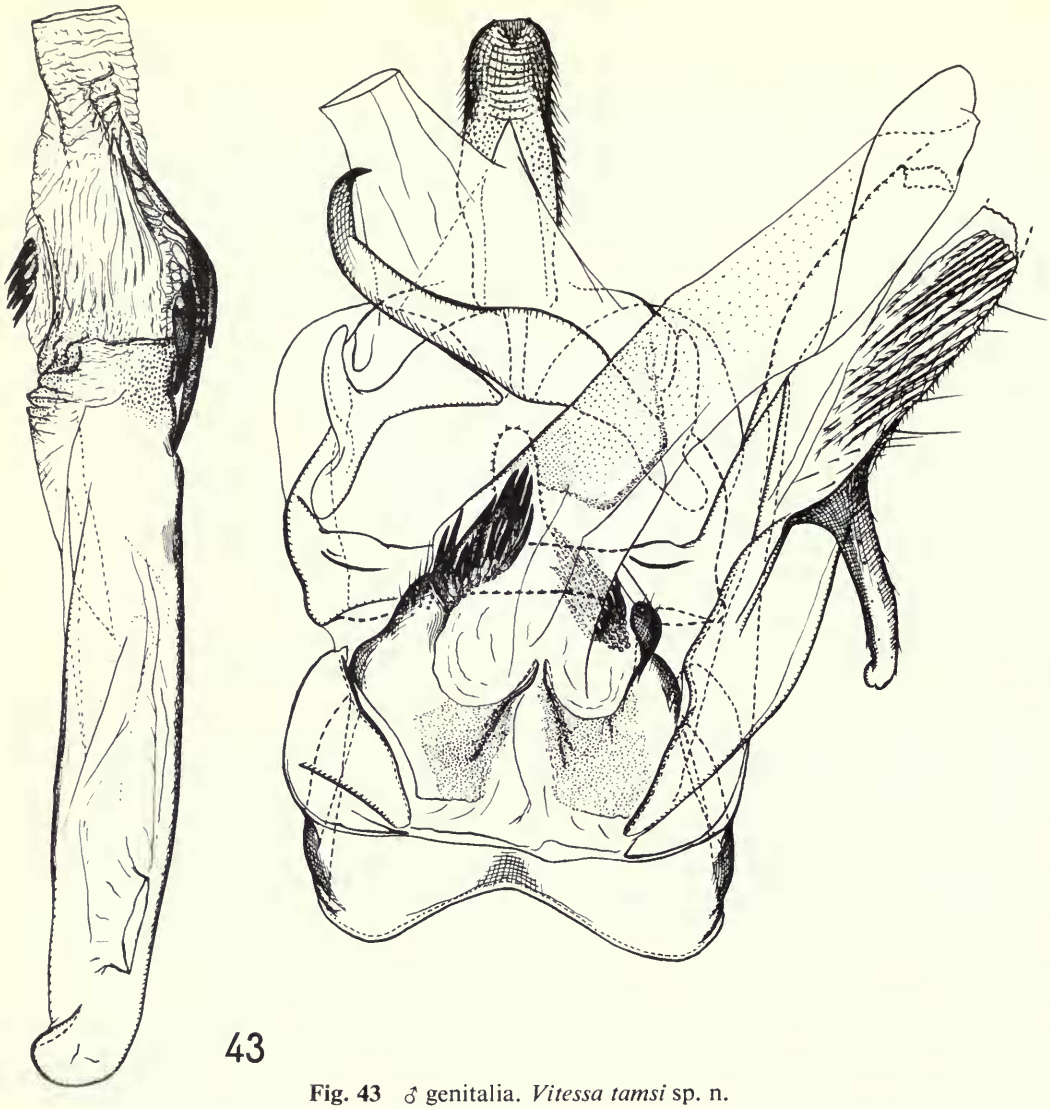


Fig. 43 ♂ genitalia. *Vitessa tamsi* sp. n.

MATERIAL EXAMINED

Holotype ♀, **Samoa:** Upolu, Moamoa, 2.ix.1951 (*Armstrong*) (genitalia slide no. 14629; BMNH).

Paratypes. **Samoa:** 1 ♂ (allotype), 1 ♀, Samoa, 1914–18 (*Tate*) (genitalia slide no. NMNZ 141 = 15301/a, ♂, Shaffer; NMNZ, Wellington); 1 ♀, Upolu, Hellesoi's Paddock, 500 m ('1600 ft'), 15.iii.1953 (*Armstrong*) (genitalia slide no. 15301; BMNH); 1 ♀, Upolu, Tialevi, 10.i.1967 (*Catley*) (BMNH).

The *hieratica*-group

DIAGNOSIS. Fore wing above with orange subbasal area and two whitish transverse fasciae, the latter crowded closer together near medial third of wing than in other groups with black and white hind wing; antemedial fascia complete, postmedial fascia undivided, narrowly oval, not reaching costa or posterior margin as in the few species of succeeding groups with undivided postmedial fasciae. Hind wing with pale medial area, tending to be diffuse on a fuscous background. ♂ genitalia with uncus subpyriform, bearing relatively short, poorly differentiated, laterally directed setae, contrasting with the basally broad, distally rod-like uncus with strong laterally directed setae found in other groups with white areas on hind wing. Valve with oblique serrate clasper and intersecting ridge. Anellus with heavily sclerotized lateral arms in

the form of thick straight bars not bearing spines; dorsal medial catena very large, oval and heavily spined; three cornuti clusters in aedeagus. ♀ genitalia with posterior sclerite of ostial chamber W-shaped, anterior sclerite semicircular and strongly wrinkled; corpus bursae without signa.

Vitessa hieratica Swinhoe, 1900
(Figs 13, 27, 35, 82, 83, 150, 184, 210, 241, 287)

Vitessa hieratica Swinhoe, 1900, *Cat. Eastern and Australian Lepid. Het. Coll. Oxford Univ. Mus.* **2** : 430, pl. 6, fig. 22. Holotype ♂, BORNEO: Sarawak (*Wallace*) (Type no. 873; genitalia slide no. Oxford 717-1977, Shaffer; UM, Oxford) [examined].

♂, ♀. 32–40 mm. Frons and vertex orange. Eye dark brown. Ocellus minute, oval, yellow. Chaetosema with pale yellowish setae. Antenna black, anterior surface of scape orange; dorsal scaling of nearly half apical half of shaft white. Labial palpus: first and second segments orange, third segment black. Maxillary palpus basally black, terminally orange. Basal scaling of proboscis black, ventrally flecked with orange. Neck region orange. Thorax above: orange with wide, medial, longitudinal, blue-black stripe; patagium orange with posteromedial blue-black spot; tegula orange with long anterior and terminal blue-black spots. Abdomen above: blue-black with broad whitish grey terminal lines on segments, anal tuft orange. Body below: fuscous; pectus orange; abdomen as on upperside. Legs fuscous; fore coxa with large orange patch bearing central blue-black spot; mid and hind coxae, femora and tibiae banded with whitish grey. Fore wing short and narrow; above: basal area blue-black with small patch of white at base of posterior margin; subbasal area of irregular width, basally orange and medially white, slightly short of costa but reaching posterior margin, both margins acutely angled at base of cell, sharply widened again to region of *CuP*, then truncated and widened on reaching posterior margin. Antemedial fascia white, reaching margins of wing, at posterior margin narrowly joined to subbasal area, the fascia wide, medially radiating in narrow lines towards postmedial fascia at *R* stem, Cu_1, A_1 and posterior margin, line at *Cu* touching postmedial fascia. Postmedial fascia white, large, oval, not reaching margins of wing. Dark areas on wings blue-black; terminal area wide with white vein-lines. Fringe greyish fuscous. Hind wing above with basal area whitish, variably suffused with fuscous from margins, costal and distal margins diffusely blue-black. Fringe basally fuscous, distally white. Fore wing below blue-black; retinaculum light grey; postmedial fascia smaller than on upperside; apex and anterior part of fringe narrowly whitish grey, posterior margin white. Hind wing below: as on upperside but with blue-black margin demarcated from whitish basal area. Hind wing of ♀ with well-demarcated margins above and below.

GENITALIA ♂ (Figs 27, 35, 150, 184, 210). Uncus short, laterally swollen at base, distally tapering and with laterally directed setae, tip broadly acuminate. Gnathos long, basal arms nearly straight, tapering distally and converging at an acute angle, medial process strong, tapering, tip hooked. Transtilla strong, shallowly V-shaped, of even width. Tegumen anteriorly directed, posterior and anterior sclerites constricted, anterior margin of anterior sclerite with large posteriorly directed keyhole-shaped emargination; posterior sclerite weak. Vinculum broad, with base slightly concave. Valve long and wide, costa heavily sclerotized and sinuate, valve broadest postmedially, apex narrowly rounded; clasper small, angulate with a curved carina. Juxta with narrow lateral sclerites bearing long dorsal and ventral processes; ventral process supporting base of anellus (Fig. 184); dorsal process (Fig. 27) posteriorly setose and connected to long, straight, heavily sclerotized, unspined, lateral sclerite on anellus, terminally connected to flat, wide, sclerotized bands on manica; long dorsal catena (Fig. 35), narrow, oval, heavily spined. Aedeagus of moderate length, distally expanded, base narrowly rounded; ductus ejaculatorius subbasal; spines on vesica dorsally and ventrally, vesica on ventral surface at distal end of aedeagus bulbous and transversely rugose; dorsal side of vesica between cornuti clusters longitudinally rugose. Three cornuti clusters (Fig. 210); two long curved lateral proximal clusters, right slightly longer than left and with shorter spines; single distal cluster minute with about four spines.

GENITALIA ♀ (Figs 241, 287). Ovipositor lobes high, narrow, dorsally fused and prolonged posteriad; posterior surface densely setose, longer setae on margin, spiny setae visible at ×100 magnification. Posterior apophysis short, narrow, angled slightly near tip. Anterior apophysis short, narrow, angled slightly at base and near tip. Posterior ostial sclerite (Fig. 287) long and wide, with three well-defined and highly sclerotized border regions laterally and anteriorly, a central roughly circular area well defined but not sharply demarcated in sclerotization. Anterior sclerite membranous with sclerotized incurved wrinkled base, laterally denticulate. Antrum broadly oval. Ductus bursae with funnel-shaped swelling posteriorly, lightly spinose. Corpus bursae large, membranous, oval; signa absent.

REMARKS. This rare species is easily distinguished externally from *V. suradeva* and other species with generally similar maculation by the undivided oval postmedial white fascia of the fore wing, connected to the antemedial white fascia by a white streak along Cu_1. In other species of similar appearance the postmedial fascia is bi- or tripartite and is usually not connected to the antemedial white fascia along Cu_1. The species is distinct from all other species in both ♂ and ♀ genitalia, as indicated in the diagnosis of the species-group.

BIOLOGY. Early stages and host-plant unknown. Moths collected in January, February, July to September and November.

DISTRIBUTION (Fig. 13). Sumatra; Borneo: Sarawak, Sabah.

MATERIAL EXAMINED

Sumatra: 1 ♀, Benkulen [Bengkulu] [3°47′ S, 102°15′ E], xi.1921 (*Brooks*) (TM, Pretoria); 1 ♀, Lebong Tandai [3°02′ S, 101°56′ E], i.1922 (*Brooks*) (BMNH). **Borneo:** 1 ♂, Sarawak, Mt Matang [1°36′ N, 110°11′ E] (*Mjoberg*) (BMNH); 1 ♀, S., Bidi, 1907–1908 (*Brooks*) (TM, Pretoria); 1 ♀, S., Mt Penrissen [1°07′ N, 110°13′ E] (*Janse*) (TM, Pretoria); 2 ♀, S., Kuching, Semongok, secondary forest, ii.1976 (*Classey*) (BMNH); 2 ♀, S., Semongok, 19.3 km ('12 mls') south of Kuching, iii, v.1974 (*Earnshaw*) (CNC, Ottawa); 2 ♂, S., Gunong Mulu Nat. Park, Mulu, 1790 m, 452463 lower montane (moss) forest, MV – canopy, i.1978 (*Holloway et al.*) (BMNH); 1 ♂, Sabah, Mt Kinabalu, 'Power Station', 1950 m, vii–ix.1965 (*Holloway*) (BMNH).

The *stettina*-group

DIAGNOSIS. Fore wing above with two transverse whitish fasciae and an orange subbasal area; the postmedial white fascia usually and the antemedial fascia sometimes divided into two or more spots. Hind wing with white or whitish discal area and black terminal margin, the latter narrowing posteriorly. In the ♂ genitalia uncus differentiated into a short, relatively wide basal portion and a long, slender, rod-like, down-turned, then up-turned, distal portion, with conspicuous, laterally directed setae. Valve long, with regular fluting and weak angular clasper. Anellus with undifferentiated spineless sclerotization at junction with dorsal process of juxta. Vesica with three cornuti clusters, but, unlike the condition in previous groups, one cluster basal and two distal. In the ♀ genitalia the posterior ostial sclerite short, wide; anterior sclerite wrinkled and laterally differentiated into three portions; antrum short and wide, merging in outline with funnel-shaped posterior end of ductus bursae. Corpus bursae long and narrow, signa absent. Distinguished from the *hieratica*-group by the shape of the whitish fasciae on the fore wing, by the differentiated uncus of the ♂, and by the structure of the ostial chamber in the ♀. Differing from the *hemiallactis*-, *plumosa*- and *pyraliata*-groups by the weak clasper of the valve and from the *suradeva*-group by the oblique position and more rounded outline of the valve. Differing from all other groups by the anellus of the ♂ lacking a catena, and the corpus bursae of the ♀ lacking signa. The ♀ is distinguished from the *hemiallactis*-group by having the posterior margin of the seventh abdominal sternite straight or concave, not convex.

Vitessa philippina sp. n.
(Figs 14, 84, 242, 288)

♂. Unknown.

♀. 48 mm. Frons and vertex orange. Eye and ocellus dark brown. Chaetosema with yellowish setae. Antenna black, scape basally orange, probably with some white on posterior surface of apical third of shaft (antennae of holotype badly damaged). Labial palpus pale orange from base to near end of second segment, tip of second, all of third segment black. Maxillary palpus basally black, distally pale orange. Basal scaling of proboscis black. Neck region pale orange. Thorax above: black; patagium blue-black, bordered with pale orange; tegula blue-black, anteromedially with faint border of pale orange. Abdomen above blue-black, with narrow whitish grey terminal lines on segments, anal tuft orange. Body below black, but with white terminal lines on segments wider; pectus pale orange; legs black, banded with white. Fore wing long and narrow; above: ground colour blue-black; a subbasal orange spot, roughly triangular, anteriorly not reaching costa, posteriorly extending to A_1; white antemedial fascia divided, small spot behind costa, larger triangular spot between *Cu* and A_1; white postmedial fascia oblique, divided into two spots, a circular spot on discocellular vein and a more distal, smaller, triangular spot on *CuP*, some white scaling anterior to terminal end of this spot; in terminal area white vein-lines from R_4 to M_3 or Cu_1, well separated from postmedial fascia; fringe dark grey. Hind wing above with base, costa and termen broadly black, anal margin with thin black fringe, narrow black scaling along some veins from base, discal area and middle of anal margin white, faintly nacreous. Fore wing below: postmedial fascia almost as above,

faint traces of antemedial fascia, posterior margin white, remainder black; retinaculum dark grey; fringe apically white, dark grey below. Hind wing below as above.

GENITALIA ♀ (Figs 242, 288). High, narrow ovipositor lobes, dorsally fused and produced posteriorly, densely setose, with longer setae at margin; spiny setae visible at ×100 magnification. Posterior apophysis long, slender and slightly curved. Anterior apophysis similar but thicker and longer. Posterior ostial sclerite (Fig. 288) with irregular transverse wrinkles, posterior margin medially concave, anterior margin deeply incurved but with medial area strongly convex. Anterior sclerite with posterior margin of even width, medially with weak folds, whole margin denticulated, somewhat differentiated into three sections, protruded posterolaterally and rounded, anterior margin membranous, laterally denticulate. Antrum broad and funnel-shaped. Posterior end of ductus bursae swollen, funnel-shaped; short narrow portion of ductus spinose, merging gradually into long, narrow corpus bursae; signa absent.

REMARKS. This has fewer white vein-lines in the terminal area of the fore wing than any other species of the group. In general reduction of markings it closely resembles *V. ternatica* of the *hemiallactis*-group, but it is distinguishable by genitalia. In the Philippines, *V. pyraliata triangulifera* is very similar in appearance, but *V. philippina* is distinguishable by the larger orange subbasal area of the upperside of the fore wing and by lacking white vein-lines on the apical region of the underside of the hind wing. The ♀ genitalia of the species in this group are very similar, but in no other species are the ovipositor lobes so acutely narrowed posteriorly.

BIOLOGY. Early stages and host-plant unknown. Moths collected in April, September and October.

DISTRIBUTION (Fig. 14). Philippines: Luzon, Mindanao.

MATERIAL EXAMINED

Holotype ♀, **Philippines**: Luzon, Manila, 12.ix.1912 (*Wileman*) (genitalia slide no. 14701; BMNH).

Paratypes. **Philippines**: 1 ♀, Mindanao, Davao Province, 30.iv.1930 (*Clagg*) (CM, Pittsburgh); 1 ♀, Mindanao, 24·13 km ('15 mls') SW. Davao, Mt Apo School, 22-31.x.1965 (*Davis*) (NMNH, Washington).

Vitessa stettina Swinhoe, 1906
(Figs 15, 28, 36, 85, 86, 151, 185, 211, 243, 289)

Vitessa stettina Swinhoe, 1906, *Ann. Mag. nat. Hist.* (7) **18** : 412. LECTOTYPE ♀, NEW GUINEA: Papua, Granville [Port Moresby] 845 (genitalia slide no. 15305; BMNH), here designated [examined].

♂, ♀. 46–56 mm. Frons and vertex orange. Eye and ocellus brown. Chaetosema with pale yellowish setae. Antenna black; ventral surface of scape mainly or wholly orange; dorsal scaling of basal half of apical third of shaft white. Labial palpus with first two segments orange, third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis black. Thorax above: orange with central round blue-black spot; patagium orange with posteromedial glossy blue-black spot; tegula orange with anterolateral glossy blue-black spot. Abdomen above: blue-black with narrow whitish grey terminal lines on segments, anal tuft orange. Body below: blue-black; pectus orange; abdomen as above with wider terminal lines. Legs blue-black, with faint greenish hue in places; posterior surfaces of fore coxa, mid and hind femora whitish grey; whitish grey bands on mid and hind tibiae. Fore wing long and of moderate width; above: ground colour glossy blue-black, some orange scales at costa; orange subbasal area tapering to near posterior margin in ♀, not passing A_1 in ♂; whitish grey antemedial fascia wide, complete, almost or quite reaching posterior margin, separated from costa by a narrow line of ground colour, basal margin erect, straight, medial margin irregular, diffuse, sometimes joining postmedial fascia, especially along posterior margin; whitish grey postmedial fascia wide, complete, rounded anteriorly, sometimes reaching posterior margin, sometimes indented at Cu_2, terminal margin sinuate; terminal area with all veins whitish grey; fringe glossy dark grey. Hind wing above: base, costa and termen blue-black with violaceous reflections, white medial area extending broadly to anal margin; fringe glossy dark grey. Fore wing below: bluish fuscous with violaceous reflections; reduced whitish grey postmedial fascia; few whitish grey apical vein-lines; posterior margin white; retinaculum dark grey; fringe dark grey. Hind wing below as above, apical part of costa, few apical vein-lines and anterior portion of fringe whitish grey.

GENITALIA ♂ (Figs 28, 36, 151, 185, 211). Uncus long, narrow, basally widened, distally tapering with long laterally directed setae, down-curved then up-curved, apex sharp. Gnathos with flat lateral arms converging gradually to the rounded, hook-like, acuminate medial process. Transtilla gently curved to centre,

medially widened. Tegumen: posterior sclerite with wide rounded shoulders, anterior sclerite posteriorly directed medially with large keyhole-shaped medial emargination. Vinculum broad, basally truncated. Valve long, narrow, costa inflated, apex moderately rounded, termen broadly rounded, posterior margin almost straight for most of length; narrow longitudinal striations on mesal surface; clasper short, oblique, slightly separated from curved carina, a small serrate ridge ending ventrally before margin in a basally directed tooth-like process. Juxta with large narrow lateral sclerites, ventral process strongly upturned, flat, narrow and twisted, supporting base of anellus (Fig. 185); dorsal process shorter, wider, bearing setae, connected to sinuate, distally reticulated sclerite supporting side of anellus (Fig. 28); medial to tips of sclerites are two small irregular sclerotized and ridged areas (Fig. 36); in continuation with sclerites, flat sclerotized bands supporting base of manica. Aedeagus of moderate length, distally expanded, base narrowly rounded; ductus ejaculatorius subbasal. Vesica with spines spreading ventrally to distal end of aedeagus, here the vesica bulbous and transversely rugose; vesica wide to just beyond area of cornuti, membrane between cornuti clusters longitudinally rugose; cornuti (Fig. 211) in three clusters, a single small basal cluster with tight pack of small spines, two larger distal clusters with longer spines, left cluster shorter than right.

Genitalia ♀ (Figs 243, 289). Ovipositor lobes high, narrow, dorsally fusing, posteriorly produced; posterior surface densely setose, longer setae on margin, spiny setae visible at ×100 magnification. Posterior apophysis long, slender, weakly curved, blunt; anterior apophysis longer, thicker, blunt; Posterior ostial sclerite (Fig. 289) broad, longitudinally wrinkled, posterior margin with medial thickened bar, anterior margin medially upturned, with prominent curved flap, margin finely denticulated; anterior sclerite broad, posterior margin concave, slightly wrinkled, denticulate, differentiated into three slightly overlapping denticulate plates, each rounded posteriorly, lateral plates posterolaterally protruded; antrum wide and fairly long, conforming with swollen end of ductus bursae, cup-shaped; ductus bursae minutely spinose, short, merging imperceptibly with elongated narrow corpus bursae; signum absent.

Remarks. This species most closely resembles externally the superficially almost identical *V. intermedia* of the *hemiallactis*-group, with which it flies, at least at higher altitudes, in New Guinea. It can be distinguished from *V. intermedia* by having less diffusion of white into the medial area of the fore wing; in *V. intermedia* the fusion between the white fasciae is more extensive, showing little of the blue-black medial area. The species-group characters of the genitalia are of course diagnostic. In the ♀ a quick diagnosis for all the *stettina*-group can be made by dry examination of the posterior margin of the ventral posterior sternite; this is lightly sclerotized and fairly straight in the *stettina*-group, heavily sclerotized and convex in the *hemiallactis*-group, showing as pale yellowish brown in the former and dark reddish brown in the latter, the colours being enhanced by using toluene. *V. stettina* is distinct from others in the group in the greater development of the white fore wing fasciae. It is distinct from all other species in the ♂ genitalia, as far as known, by the shape of the valve and clasper and especially by the absence of dorsal catena spines on the anellus; and in the ♀ genitalia by the shape of the anterior ostial sclerite and by the absence of signa.

Biology. Early stages and host-plant unknown. Moths collected in most months of the year.

Distribution (Fig. 15). Waigeo; New Guinea: Irian Jaya, Papua New Guinea.

Material examined

Paralectotypes. **New Guinea:** 1 ♀, Papua New Guinea, data as lectotype (genitalia slide no. 15321; BMNH); 5 ♂, 6 ♀, P. N. G., Mount Kebea, 1100–1850 m, iii–viii.1903 (*A. E. Pratt*) (BMNH). [1 ♂, 1 ♀, see under paratype series of *Vitessa intermedia* (p. 299).]

Waigeo: 1 ♂, 1 ♀, 1904 (*Waterstradt*) (BMNH). **New Guinea:** 1 ♀, Irian Jaya, Ninay Valley, Central Arfak Mts, 1050 m, ii–iii.1909 (*Pratt*) (BMNH); 1 ♂, 2 ♀, I. J., Nomnagihe, 40·23 km south of Wangaar, 600 m, i–ii.1921 (*C. F. & J. Pratt*) (TM, Pretoria); 1 ♀, I. J., Hollandia [Sukarnapura], iii.1960 (*Maa*) (BPBM, Honolulu); 1 ♀, I. J., Hollandia area, Sentani, 100 m, vi.1959 (*Gressitt & Maa*) (BPBM, Honolulu); 1 ♀, I. J., Waris, S. of Hollandia, 450–500 m, viii.1959 (*Maa*) (BPBM, Honolulu); 1 ♂, no data (*Janse*) (TM, Pretoria); 4 ♂, 3 ♀, Papua New Guinea, Sepik District, Bainyik, 300 m, x–xi.1957 (*Munroe & Holland*) (CNC, Ottawa); 4 ♀, P. N. G., Ekeikei, 450 m, i–iv.1903 (*Pratt*) (BMNH); 1 ♀, P. N. G., Mount Kebea, 1100–1850 m, iii–viii.1903 (*A. E. Pratt*) (CMAG, Birmingham); 1 ♀, P. N. G., Mafalu, 1850 m, viii.1903 (*Pratt*) (BMNH); 1 ♀, P. N. G., Babooni, 1100 m, ix.1903 (*Pratt*) (BMNH); 37 ♂, 16 ♀, P. N. G., Sogeri Plateau, Mageri, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 2 ♂, 2 ♀, P. N. G., Sogeri Plateau, Bisianumu, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♂, P. N. G., Port

Moresby, Mt Lawes, 400 m, iii–v.1967 (*Brandt*) (ANIC, Canberra); 1 ♂, 2 ♀, P. N. G., Hydrographer Mts, 750 m, ii–iii.1918 (*Eichhorn Bros.*) (BMNH).

Vitessa hollandi sp. n.

(Figs 16, 17, 87-90, 152, 153, 186, 187, 244, 245, 290, 291)

♂, ♀. 36–50 mm. As in *V. stettina*, except as follows. Only base of scape ventrally orange. Thorax above: variable, orange, yellowish white or greyish white with blue-black medial spot variable in size; patagium orange with large posteromedial glossy blue-black spot; tegula glossy blue-black, laterally orange. Abdomen above with narrow whitish grey terminal lines on first three segments only; below with broad whitish grey terminal lines on most segments. Fore wing appearing narrower; upperside with large orange subbasal area not reaching costa or passing A_1, basally acutely angled, medially obliquely curved. Antemedial fascia white, basal edge nearly straight and erect, slightly short of both costa and posterior margin, broadly indented or divided at cell, medially broadened and diffuse; postmedial fascia broad, divided into two spots at about *CuP*, upper spot large and round, lower spot triangular, sometimes with small white spot terminally above, regularly followed by a streak on posterior margin, often fusing with medial extension of antemedial fascia. Hind wing above with white medial area variably extended to anal margin, anal margin with thin black scaling. Fore wing below: postmedial fascia complete and obliquely oval, or divided at *CuP*, spots as on upperside.

Genitalia ♂ (Figs 152, 153, 186, 187). In general as described for *V. stettina*. Valve apex narrowly rounded, termen short, posterior margin broadly rounded.

Genitalia ♀ (Figs 244, 245, 290, 291). In general as described for *V. stettina*, but see Remarks.

Remarks. This species is nearly indistinguishable in genitalia from the largely allopatric *V. stettina*; in the ♂ genitalia the valve apex is more narrowly rounded and the termen more acute; in the ♀ genitalia the lateral margins of the antrum (Figs 290, 291) and the swollen end of the ductus bursae are more oblique than in *V. stettina*. The antenna appears to be more slender in both sexes in the present species. Externally, the reduced pale markings of the upperside of the fore wing are distinctive from *V. stettina*, but are deceptively similar to those of *V. hemiallactis hemiallactis* of the *hemiallactis*-group, with which *V. hollandi* flies. The posteriorly tapering terminal band of the hind wing usually distinguishes the present species from *V. hemiallactis* and the genitalia are very distinct in both sexes (see species-group diagnoses, also Remarks under *V. stettina*). *V. hollandi* is superficially indistinguishable from *V. gemina* of the *pyraliata*-group but again differs in genitalia (see species-group diagnosis). We recognize two subspecies, one from New Guinea and the Kepulauan Schouten, the other from Sulawesi. Limited material from the Moluccas and New Britain may represent further subspecies. We take pleasure in dedicating this species to Dr G. P. Holland, co-collector of the holotype, and companion of the senior author in a highly productive collecting expedition to Papua New Guinea.

Biology. Early stages and host-plant unknown. Moths collected in almost every month of the year.

Distribution (Figs 16, 17). Sulawesi; Moluccas; New Guinea; Kepulauan Schouten; New Britain.

Vitessa hollandi wallacealis subsp. n.

(Figs 17, 87, 88, 152, 186, 244, 290)

♂, ♀. 36–46 mm. Generally as described for species. Thorax above: anteriorly orange, posteriorly whitish grey, large arrow-shaped medial blue-black spot; patagium orange with very large posteromedial glossy blue-black spot; tegula glossy blue-black, laterally yellowish white. Fore wing above: subbasal area orange tinged with yellow; antemedial fascia white, divided at cell into two spots in ♂ and mostly in ♀; postmedial fascia divided into two spots at *CuP*; terminal white vein-lines very weak posterior to Cu_1, touching postmedial fascia at Cu_1. Hind wing above: blue-black marginal band wide, its basal margin less strongly concave than in nominate subspecies, basal white area restricted. Fore wing below: postmedial fascia with strong round spot but weak triangular spot; white apical lines hardly visible. Hind wing below: white apical lines hardly visible.

GENITALIA ♂ (Figs 152, 186). Generally as described for species. Valve narrow; uncus gradually tapering from basal section.

GENITALIA ♀ (Figs 244, 290). As described for species.

REMARKS. This is distinguished from the nominate subspecies by the narrower and generally restricted white markings; the antemedial fascia is mostly divided into two spots. On the hind wing the black border is broader in the middle of the wing, its basal margin is less strongly concave, and the white area is more restricted, especially in the ♂. The underside markings are greatly reduced; the postmedial fascia on the fore wing is divided into two spots, whereas it is generally a single large spot in *V. hollandi hollandi*; on the hind wings the apical white lines are reduced. In the ♂ genitalia the uncus tapers more evenly and the valve is narrower (see also Remarks under *V. hollandi hollandi*).

BIOLOGY. Early stages and host-plant unknown. Moths collected in May and June.

DISTRIBUTION (Fig. 17). Sulawesi: central, north-eastern and south-eastern regions.

MATERIAL EXAMINED

Holotype ♂, **Sulawesi:** Menado (*Van Braeckel*) (genitalia slide no. 14635; BMNH).

Paratypes. **Sulawesi:** 1 ♀ (allotype), data as holotype (BMNH); 2 ♀, Paloe, Sidaonta, 1350 m ('4500 ft'), vi.1937 (*Kalis*) (genitalia slide no. 15308; BMNH); 1 ♀, Paloe, Koelawi 1°25′ S, 119°58′ E, 950 m ('3100 ft'), iii.1937 (*Kalis*) (genitalia slide no. 14686; BMNH); 1 ♀, Paloe, Loda, 1200 m ('4000 ft'), v.1937 (*Kalis*) (BMNH); 2 ♀, Minahassa, Tomohon, 1–9.vi & 26–29.vii.1954 (*Alston*) (genitalia slide no. 15307; BMNH); 2 ♀, Ulu Kolaka, 500 m, v–vi.1939 (*Kalis*) (BMNH).

Vitessa hollandi subsp.

The following two specimens probably represent a distinct subspecies, but without more material we prefer not to name it.

♂, ♀. 46–50 mm. Fore wing above: orange subbasal area of similar size to that of *V. hollandi wallacealis*; antemedial fascia indented but not interrupted, wider than in *V. hollandi hollandi* though not as wide as in *V. stettina*; postmedial fascia oblique, divided into two spots, as in *V. hollandi hollandi*. Hind wing above with tapering black terminal band. White markings on underside of both wings as in *hollandi hollandi*.

DISTRIBUTION. Moluccas.

MATERIAL EXAMINED

Moluccas: 1 ♂, Batjan, viii.1897 [abdomen missing] (*Doherty*) (BMNH); 1 ♀, Obi, Laiwui, ix.1897 (*Doherty*) (BMNH).

Vitessa hollandi hollandi subsp. n.

(Figs 16, 89, 90, 153, 187, 245, 291)

[*Cosmethis suradeva* (Moore); Janse, 1928 : 88. Misidentification.]

♂, ♀. 40–50 mm. Generally as described for species. Thorax above: orange with large arrow-shaped medial blue-black spot; patagium orange with large posteromedial glossy blue-black spot; tegula glossy blue-black, laterally pale orange. Fore wing above: subbasal area orange; antemedial fascia white, broadly indented at cell; postmedial fascia white, divided into two spots, upper large round spot over discocellular vein, not reaching costa, lower triangular spot over *CuP*, smaller dot above, between Cu_1 and Cu_2; white streak along posterior margin joining streak from antemedial fascia; terminal area with white vein-lines, sometimes absent on *CuP*, touching postmedial fascia at A_1. Hind wing above: blue-black terminal band wide at apex, gradually tapering, narrow near anal margin. Fore wing below: postmedial fascia with large round spot and adjoining lower marking; white apical lines weak. Hind wing below: white apical lines weak.

GENITALIA ♂ (Figs 153, 187). Generally as described for species. Valve broad; uncus with basal and distal sections well demarcated.

GENITALIA ♀ (Figs 245, 291). As described for species.

REMARKS. The subspecies is restricted to New Guinea and adjacent islands; it is rarer in Papua, where *V. stettina* occurs sympatrically, than in north-eastern New Guinea. In New Guinea it

occurs with *V. hemiallactis hemiallactis*, which it closely resembles externally (see Remarks under *V. hollandi* and *V. stettina*, pp. 288–289; for distinguishing features from *V. hollandi wallacealis* see Remarks under the subspecies, above). In Kepulauan Schouten *V. hollandi hollandi* bears a similar relation to *V. gemina* (p. 312). We have not examined the specimen recorded by Janse as *V. suradeva* from Mefor, Kepulauan Schouten. It may be referable to this subspecies or to *V. gemina*. It is almost certainly not *V. suradeva*.

BIOLOGY. Early stages and host-plant unknown. Moths collected in most months of the year.

DISTRIBUTION (Fig. 16). Kepulauan Schouten; New Guinea: Papua New Guinea.

MATERIAL EXAMINED

Holotype ♂, **New Guinea:** Papua New Guinea, Finisterre Mts, Wantoat, 1200 m ('4000 ft'), 13.ix.1957 (*Munroe & Holland*) (genitalia slide no. DK 113; CNC, Ottawa; type no. 11,021).

Paratypes. **New Guinea:** 3 ♀, Papua New Guinea, vic. Wewak, Koigin, 350 m ('1200 ft'), 22–24.x.1957 (*Munroe & Holland*) (CNC, Ottawa); 3 ♀, P. N. G., Sepik District, Padwe R., 26.x.1957 (*Munroe & Holland*) (CNC, Ottawa); 30 ♀, P. N. G., Sepik District, Bainyik, 350 m ('1200 ft'), 29.x.–28.xi.1957 (*Munroe & Holland*) (genitalia slide no.'s DK 133, DK 134, DK 136; CNC, Ottawa); 1 ♀, P. N. G., Astrolabe Bay (*Wahnes*) (genitalia slide no. 15336; BMNH); 2 ♂, 32 ♀ (including allotype), P. N. G., data as holotype, 5.ix.1957 (genitalia slide no.'s DK 114, 15336/a, Shaffer; CNC, Ottawa); 6 ♀, P. N. G., Morobe District, *Araucaria* Forest, Bulolo, 1200 m ('4000 ft'), 23.ix.1957 (*Munroe & Holland*) (genitalia slide no.'s DK 112, DK 120; CNC, Ottawa); 3 ♀, P. N. G., Hunstein-Gebirge, Wagu/Black River, i–ii.1973 (*Hohmann*) (UM, Bremen); 2 ♀, P. N. G., Mount Kebea, 1100 m ('3600 ft'), iii.viii.1903 (*A. E. Pratt*) (genitalia slide no.'s 15329, 15335; BMNH); 4 ♀, P. N. G., Sogeri Plateau, Mageri, 500 m ('1600 ft'), 15.viii.1957 (*Munroe & Holland*) (genitalia slide no.'s DK 517, DK 520, DK 521; CNC, Ottawa); 1 ♂, P. N. G., Sogeri Plateau, Bisianumu, 500 m ('1600 ft'), 11.viii.1957 (*Holland*) (genitalia slide no. DK 175; CNC, Ottawa); 1 ♀, P. N. G., Bisianumu, NE. of Port Moresby, 150 m, vi.1957 (*Hardy*) (BPBM, Honolulu).

Material excluded from paratype series. **Kepulauan Schouten:** 1 ♀, Mefor ('Numfoor'), Suer, v–vi.1897 (*Doherty*) (BMNH). **New Guinea:** 1 ♀, P. N. G., Mount Kebea, 1100 m., vii.1903 (*A. E. Pratt*) (fore wing, thorax and head of *V. hemiallactis hemiallactis*; hind wing and abdomen, glued on, of *V. hollandi hollandi* (BMNH)).

Vitessa hollandi subsp.

The following specimen probably represents a distinct subspecies, but without more material we prefer not to name it.

♀. 50 mm. Fore wing above: orange subbasal area of similar size to that of *V. hollandi hollandi*; narrow antemedial and postmedial fasciae divided into two spots as in *V. hollandi wallacealis*, but lower spot of postmedial fascia more oblique; terminal area with white vein-lines much shorter than in any other subspecies, from M_3 to Cu_2. Hind wing above and white markings on underside of both wings as in *V. hollandi hollandi*.

DISTRIBUTION. Bismarck Archipelago: New Britain.

MATERIAL EXAMINED

Bismarck Archipelago: 1 ♀, New Britain, Yalom, 1000 m, v.1962, at mercury vapour light (ZM, Copenhagen).

The *hemiallactis*-group

DIAGNOSIS. Wing markings either like those of *stettina*-group, or with the pale fasciae on the upperside of fore wings greenish, expanded and partly or wholly merged, leaving a wedge-shaped black spot in cell. Hind wing with white medial area and contrasting black terminal band. ♂ genitalia with uncus basally wide, distally rod-like, with a row of laterally directed setae on each side. Valve less regular in outline than in *stettina*-group, posterior margin concave at centre; clasper larger and more prominent than in *stettina*-group, forming a finely serrulate ridge, differing from the coarsely serrate ridge of the *pyraliata*-group and the bifid process of the *plumosa*-group; costal margin of valve weakly curved subbasally and valve oblique in dorsoventral preparation, as compared with the strongly curved costa and horizontal valve of the *suradeva*-group. Large dorsal catena present on anellus. Cornuti consisting of three clusters, two basal dorsolateral and one distal ventrolateral. ♀ genitalia with much heavier ostial sclerotization than in

stettina-group, similar to that of *pyraliata*-group. Posterior sclerite with lateral prolongations anteriorly directed; anterior sclerite recurved and wrinkled, differentiated at centre, forming an anteriorly directed pouch; antrum greatly extended posteriorly to form a trapezoidal plate fitting between the prolonged sides of the posterior sclerite. Corpus bursae with signa consisting of paired denticulate areas. ♀ seventh abdominal segment with posterior margin convex, not concave or straight as in *stettina*-group.

Vitessa ternatica Lederer, 1863
(Figs 17, 91, 92, 154, 188, 212, 246, 292)

Vitessa ternatica Lederer, 1863, *Wien. ent. Monatschr.* **7** : 335, 456, pl. 6, fig. 7. Holotype ♀, MOLUCCAS: [Ternate] ex Felder coll. (genitalia slide no. 15306; BMNH) [examined].

Vitessa ternatica Lederer; Hampson, 1896*a* : 503.

Vitessa sarumensis Holland, 1900, *Novit. zool.* **7** : 582. LECTOTYPE ♀, MOLUCCAS: Buru (*Doherty*) (genitalia slide no. 155 DK; CM, Pittsburgh), here designated [examined]. **Syn. n.**

♂, ♀. 42–44 mm. Frons orange. Vertex orange admixed with black. Eye, ocellus fuscous. Chaetosema with pale yellowish setae. Antenna black, ventral surface of scape orange at base; dorsal scaling of basal half to three-quarters of apical third of shaft white; terminal segments pale fuscous. Labial palpus: first segment orange, second segment orange with black admixed distally, third segment black. Maxillary palpus basally black, distally orange. Proboscis basally black. Thorax above: blue-black, with an orange line anteriorly, terminally and laterally marked with greyish white; patagium glossy blue-black, anteriorly and laterally admixed with orange; tegula glossy blue-black, anteromedially and laterally orange. Abdomen above black, some pale grey laterally, terminal margins of segments narrowly pale grey, anal tuft orange. Body below fuscous; pectus orange; abdomen black, terminal margins of segments pale grey, anal tuft orange. Legs black, ventral surfaces of mid and hind femora white, mid tibia with white band at centre, tips of mid and hind tibiae and spurs white. Fore wing long and narrow; above: glossy blue-black; orange subbasal area restricted to small spot on *CuP* with isolated orange scales above and at base; antemedial fascia white, single triangular spot on *CuP*, sometimes minute dot near costa; postmedial fascia white, divided into two spots, large round spot over discocellular vein, more distal smaller spot on *CuP*; terminal area with white vein-lines on most veins, as far as Cu_2 in ♂; fringe basally dark grey, distally light grey. Hind wing above mostly blue-black with violaceous reflections, white medial area small, comma-shaped, directed towards base; fringe basally dark grey, distally white at apex, continuing as light grey to anal margin. Fore wing below: blue-black with violaceous reflections; retinaculum rosy pale grey; postmedial fascia forming one large oblique oval spot in ♂; similar to that of upperside in ♀; apex with white vein-lines from R_4 to Cu_1; posterior margin white; fringe as above. Hind wing below similar to upperside, but apex with white lines from costal margin to Cu_1.

GENITALIA ♂ (Figs 154, 188, 212). Uncus fairly long, slender, basal third wider and flattened, distal two-thirds rod-like, laterally setose, recurved, then up-turned, terminally blunt. Gnathos with lateral arms wide, posteriorly curved, central portion compressed, sickle-shaped and acuminate. Transtilla broadly V-shaped, medially widened. Tegumen with posterior sclerite semicircularly expanded, anterior sclerite with anterior margin strongly angled at centre with keyhole-shaped emargination. Vinculum broad and basally convex. Valve long and broad; costa inflated, termen shallowly rounded, meeting costa at right angles, posterior margin broadly concave at centre; striations on mesal surface fine; clasper ridge prominent, oblique, joining carina ridge; at mid-length rising to isolated acuminate peak, falling gradually with two or more minor points, parallel to mesal surface for short distance, rising and rounded with serrate edge to posterior margin. Juxta with large narrow lateral sclerites; ventral process wide at base, strongly up-turned, abruptly narrowing; dorsal process broadly rectangular, bearing setae at tip, joined to heavily sclerotized and almost tubular lateral sclerite on anellus (Fig 188); sclerite connected to dorsal catena via heavily sclerotized ridged bars; catena with compressed spines posteriorly, longitudinal ridges anteriorly; manica with light sclerotization for most of length. Aedeagus long, distally tapering, base narrowly rounded; ductus ejaculatorius nearly subbasal. Vesica with spines spreading ventrally to distal end of aedeagus, membrane in this region bulbous and transversely rugose; vesica wide to just beyond area of cornuti, membrane anterior to cornuti longitudinally rugose and spinose; cornuti (Fig. 212) with two basal dorsolateral clusters, left cluster broadly connected with gradually shortening spines to heavily sclerotized cap at angle of reflexion, right with almost isolated cluster of spines connected to cap by very thin bar; posterior ventral cluster isolated and opposite to cap.

GENITALIA ♀ (Figs 246, 292). High, narrow ovipositor lobes, dorsally fused, posteriorly produced; surface densely setose, longer setae on margin, spiny setae visible at ×100 magnification. Posterior apophysis short, slender, curved, tip truncated. Anterior apophysis much larger, thicker, curved, tip truncated.

Posterior sclerite of ostial chamber (Fig. 292) with lateral prolongations anteriorly directed; membrane above finely denticulate; posterior margin broadly concave, medial anterior margin slightly projected to meet antrum; anterior sclerite well developed, ventrally with recurved broad band, slightly wrinkled, membrane beyond finely denticulate, sclerite laterally widening and greatly extended anteriorly, combining with antrum to form a high wide dorsal surface; antrum extended posteriorly into a trapezoidal plate fitting between the lateral prolongations of posterior margin. Basal end of ductus bursae wide and stretched at junction with broad antrum, remainder of ductus narrow, spinose. Corpus bursae oval, bearing small paired denticulate areas.

REMARKS. The small size and greatly reduced antemedial fascia and orange subbasal area give this species a distinctive appearance; the broadly dark anal margin of the hind wing and the enclosed comma-shaped white area distinguish the species from *V. hemiallactis moluccana*. We find no obvious differences in specimens from the Moluccan localities. The New Guinea ♂ has white markings on the fore and hind wings noticeably reduced; this locality is questionable for the specimen bears no other data though it is labelled as coming from the de Joannis collection. The genitalia of both sexes are distinct from those of other species in this group; the clasper on the valve of the ♂ and the great length of the antrum in the ♀ are the most striking features.

BIOLOGY. Early stages and host-plant unknown.

DISTRIBUTION (Fig. 17). Moluccas: Ternate, Buru, Seram; New Guinea.

MATERIAL EXAMINED

Moluccas: 2 ♀, [Ternate] ex Felder coll. (BMNH); 1 ♂, 3 ♀, Buru (*Doherty*) (CM, Pittsburgh; CNC Ottawa) (paralectotypes of *Vitessa sarumensis* Holland); 1 ♀, Seram, Wahaai (*Moens*) (RNH, Leiden); 1 ♀, Seram (*R.*) (RNH, Leiden); 1 ♀, Seram, Jllo (BMNH); 1 ♀, Seram (BMNH); 2 ♀, no data, ex Moore coll. (BMNH); 1 ♀, no data (*Piepers*) (RNH, Leiden). **New Guinea:** 1 ♂, no data, 1920–1932 coll. L. & J. de Joannis (MNHN, Paris).

Vitessa sp.

(Figs 93, 155, 189)

The following specimen represents a distinct species, but because it bears very dubious data we prefer not to name it.

♂. 44 mm. Generally as described for *ternatica*. Frons and vertex bright dark orange. Antennae missing. First two segments of labial palpus orange, third segment missing. Thorax blue-black, posteriorly bordered with white; patagium anteriorly orange, posteriorly glossy blue-black; tegula glossy blue-black, anteriorly flecked with orange. Fore wing above, subbasal area bright dark orange, extending from costa to A_1; white antemedial fascia extending from costa to A_1, medially diffuse; white postmedial fascia divided into two spots, anterior round spot over discocellular vein, posterior triangular spot over *CuP* directly behind anterior spot; terminal area with white vein-lines; fringe missing. Hind wing with very broad blue-black margin, white area much restricted by infuscation from base; fringe basally dark grey, distally white.

GENITALIA ♂ (Figs 155, 189). Generally as described for *V. ternatica*. Clasper on valve a prominent oblique ridge, at mid length rising to isolated acuminate peak, curving convexly to posterior margin with irregular serrations. Cornuti consisting of three clusters, left dorsolateral cluster with long sclerotized base and small cluster of spines distally; right dorsolateral cluster consisting of a few sclerotized spine bases; single ventral cluster a tight pack of shorter spines.

REMARKS. This distinctive species seems mid way in some of its features between *V. ternatica* and *V. hemiallactis*. It bears a strong resemblance to *V. hemiallactis moluccana* but is distinguished by the orange subbasal area reaching the costa, and by characters of the genitalia. In accordance with resemblances already noted between other species within *Vitessa* which occur in the same island or island-group it is reasonable to assume that this species might originate from the Moluccas or somewhere nearby. The data label gives Japan, but it has been confirmed by Dr H. Inoue (*in litt.*) that no Pyralinae of this genus or any moths resembling this species are known from the Japanese Islands. The genus occurs as far north as north India, Burma and north Vietnam, but in the Pacific is not known to extend north of Luzon in the Philippines. It is possible that the label is a misspelling of Japen (Kepulauan Schouten), but the Rev. J. C. E. Riotte

informs us there is no direct evidence at the BPBM of the true provenance of this specimen or others similarly labelled.

MATERIAL EXAMINED
Locality unknown: 1 ♂, Japan (BPBM, Honolulu).

Vitessa hemiallactis Meyrick, 1887
(Figs 17–19, 29, 37, 94–101, 156–159, 190–193, 213, 247–250, 293–296)

Vitessa hemiallactis Meyrick, 1887 : 193.

♂, ♀. 40–56 mm. Frons and vertex orange, sometimes admixed with black scales. Eye and minute ocellus brown. Chaetosema with pale yellowish setae. Antenna black, anterior surface of scape basally orange; dorsal scaling of apical third of shaft white to a variable extent, last several segments black. Labial palpus: first segment orange; second segment orange, distally black; third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis black, sometimes laterally admixed with orange. Neck region orange. Thorax above with variable amounts of blue-black, anteriorly with some orange, posteriorly yellowish white; patagium either orange with large posteromedial glossy blue-black spot, or mostly glossy blue-black with anterior margin orange; tegula orange with anterolateral glossy blue-black spot and distally admixed with blue-black, or mostly blue-black with some anteromedial and outer orange scaling, or entirely blue-black. Abdomen above: matt black, posterior margins of segments with variable amounts of whitish grey, terminal segment posteriorly bordered with orange, anal tuft orange. Body ventrally and laterally blue-black; pectus orange; whitish grey abdominal lines broader than above; posterior half of terminal segment and anal tuft orange. Legs blue-black with variable amounts of white banding, a few orange scales at base of fore coxa. Fore wing rather narrow in ♂, broader in ♀; above: ground colour blue-black; orange subbasal area variable in size, not reaching costa or posterior margin; two whitish grey transverse fasciae of variable width, sometimes irregularly extending medially but never joining; antemedial fascia sometimes as wide as postmedial fascia, indented at cell or divided, variable amounts of medial diffusion; postmedial fascia broad or narrow, medially and terminally indented behind cell or divided; terminal area with variably developed white vein-lines, not reaching postmedial fascia; fringe dark grey. Hind wing above: blue-black marginal band with violaceous reflections, of variable width; black anal margin variable in width; large white medial area broadly oval or rounded; fringe dark grey basally, distally with variable amounts of whitish grey towards apex. Fore wing below: black with violaceous reflections; posterior margin variably suffused with light brown; postmedial fascia larger than above, complete or divided at Cu_2, sometimes medial streaking between Cu_2 and CuP; terminal area with apical white vein-lines; retinaculum dark grey. Hind wing below as above, with or without white apical vein-lines, these reaching termen when present.

GENITALIA ♂ (Figs 29, 37, 156–159, 190–193, 213). Uncus slender, basally flattened and laterally constricted, abruptly narrowing, terminal portion narrow, rod-shaped, decurved then up-turned with sparse laterally directed setae, tip blunt. Gnathos with widely arched lateral arms and compressed sickle-shaped medial process, tip finely acuminate. Transtilla shallowly V-shaped with strong S-shaped lateral flexure. Tegumen: posterior sclerite broad, rounded; anterior sclerite with wide medial emargination. Vinculum broad, basally concave. Valve narrow at base, widely inflated distally; costa sinuate, basally inflated; termen broadly rounded; posterior margin deeply excised medially; mesal surface with fine longitudinal converging striations; clasper a variably serrulate, continuous, diagonal ridge, with small curved carina at base. Juxta with large narrow lateral sclerites, ventral process flat, narrow and up-turned; dorsal process (Fig. 29) broader, bearing setae, directly connected to sclerotized flat sclerite supporting side of anellus (Figs 190–193), sclerotization finely reticulated dorsally, longitudinally ridged; between sclerites a large, narrow, heavily sclerotized catena (Fig. 37), constricted anteriorly, deeply ridged, posteriorly with multiple spines; manica supported by lightly sclerotized bands. Aedeagus long, distally and basally expanded, base narrowly rounded; ductus ejaculatorius subbasal; vesica with spines spreading ventrally to distal end of aedeagus, here membrane bulbous and transversely rugose; vesica evenly tapering distally, membrane between cornuti clusters longitudinally rugose; cornuti (Fig. 213) in three clusters, two basal dorsolateral clusters bearing large spines, left cluster longer than right, and a single distal ventrolateral cluster bearing smaller spines.

GENITALIA ♀ (Figs 247–250, 293–296). High, narrow ovipositor lobes, dorsally fusing, posteriorly produced; surface densely setose, larger setae on margin, spiny setae easily visible at × 100 magnification. Posterior apophysis short, slender, curved or straight; tip blunt, not expanded; anterior apophysis longer, thicker, tip slightly spatulate. Posterior ostial sclerite (Figs 293–296) with lateral prolongations

anteriorly directed, posterior margin straight or broadly convex, anterior margin medially concave; anterior sclerite ventrally with recurved broad band, slightly wrinkled, finely denticulate, bearing broad, curved medial pouch and much smaller lateral pouches; broad trapezoidal wall of antrum extending posteriorly between lateral prolongations of posterior sclerite, antrum extending anteriorly, ending in a broad curved margin; sclerotization at base of ductus seminalis; ductus bursae slightly expanded posteriorly, remainder narrow, minutely spinose; corpus bursae globular, bearing small paired denticulate areas.

REMARKS. This species is related to *V. ternatica*, but the ♂ genitalia differ considerably in the shape of the valve and clasper; in the ♀ genitalia the antrum, though sharing the posteriorly developed trapezoidal wall, is not nearly as long anteriorly. Externally *V. hemiallactis* is more lustrous, with the white area on the hind wing relatively larger and with at most a narrow black band along the anal margin. The various subspecies are easily confused externally with those of the *stettina*-group (see Remarks under *V. hollandi*), and the subspecies *admiralitatis* and *lustrans* strongly resemble the various species of the *pyraliata*-group, though these are not known to occur in the same geographical areas; nevertheless, they are easily distinguishable in the genitalia, as pointed out in the diagnosis of the species-group. In genitalia *hemiallactis* is closely similar to other species in its own group, but it is distinct externally. We recognize four subspecies, from the following geographical areas: (1) Moluccas; (2) Kepulauan Kai, Waigeo, New Guinea; (3) Admiralty Islands; (4) Bismarck Archipelago, Solomon Islands.

BIOLOGY. Early stages and host-plants unknown. Moths collected in all months of the year.

DISTRIBUTION (Figs 17–19). Moluccas; Kepulauan Kai; Waigeo; New Guinea; Bismarck Archipelago and Solomon Islands.

Vitessa hemiallactis moluccana subsp. n.
(Figs 17, 94, 95, 156, 190, 247, 293)

[*Vitessa suradeva* Moore; Pagenstecher, 1886 : 167, 188, partim. Misidentification.]

♂, ♀. 42–50 mm. Generally as described for species. Frons in ♂ orange at base with extensive blue-black above, completely orange in ♀. Vertex orange with extensive black scaling admixed. Basal scaling of proboscis blue-black, orange admixed laterally. Thorax posteriorly tipped with white; patagium glossy blue-black, medially edged with orange: tegula glossy blue-black, laterally edged with orange. Fore wing above, orange subbasal area from near costa to A_1; narrow antemedial fascia divided at cell, anterior spot minute, triangular, sub-costal, posterior spot large, oblong, medially diffuse; postmedial fascia divided at Cu_2, anterior spot large, round, over discocellular vein from stem of *R* to Cu_2, posterior spot small, triangular and over *CuP*, terminal margin level with anterior spot; terminal vein-lines extensive, not reaching postmedial fascia. Hind wing above: black terminal band broad, slightly diffuse medially; white medial area narrow, reaching anal margin. Fore wing below: postmedial fascia large, oval or narrowly divided at Cu_2, apical area with variable number of veins-lines. Hind wing below: apical vein-lines variable.

GENITALIA ♂ (Figs 156, 190). Generally as described for species. Base of valve wide. See Remarks.

GENITALIA ♀ (Figs 247, 293). Generally as described for species. Posterior edge of trapezoidal wall of antrum very broad, anterior development very narrow (Fig. 293).

REMARKS. Although only eight specimens are available they fall outside the range of variation of an extensive series of the nominate subspecies. We conjecture that Pagenstecher's record from Ambon is referable to this species and subspecies. The subspecies is distinguished from the nominate subspecies by the reduced pale markings on the wings. In the ♂ genitalia the valve base is slightly wider than in the nominate subspecies and the valve is slightly longer. In the ♀ genitalia the antrum has the trapezoidal area broader and the anterior development narrower than in any other subspecies.

BIOLOGY. Early stages and host-plant unknown. Holotype collected in September.

DISTRIBUTION (Fig. 17). Moluccas.

MATERIAL EXAMINED

Holotype ♂, **Moluccas**: Obi, Laiwui, ix.1897 (*Doherty*) (genitalia slide no. 14627; BMNH).

Paratypes. **Moluccas**: 1 ♀ (allotype), Halmaheira (*Waterstradt*) (genitalia slide no. 15818; BMNH); 1 ♂, Halmaheira, Toeelo (*Le Moult*) ([abdomen missing] BMNH); 1 ♂, Seram, 1895 (RNH, Leiden); 1 ♂, 1 ♀, Seram (*Piepers*) (RNH, Leiden); 1 ♂, 1 ♀, no data (*Piepers*) (genitalia slide no. 15818/a, Shaffer; RNH, Leiden).

Vitessa hemiallactis subsp.

The following specimen probably represents a distinct subspecies, but without adequate material or data we prefer not to name it.

♀. 56 mm. Specimen in poor condition; in most characters similar to *V. hemiallactis moluccana*. Fore wing above: lower spot of antemedial fascia broadly triangular, larger than in subspecies *moluccana*; postmedial fascia also similar but lower spot more terminally oblique. Hind wing with narrow black margin and extremely wide white medial area, exceeding any other species and subspecies in this group. Genitalia much as in *V. hemiallactis moluccana*; posterior apophyses proportionally longer.

DISTRIBUTION. Unknown.

MATERIAL EXAMINED

1 ♀, no data, Moore coll. (BMNH).

Vitessa hemiallactis hemiallactis Meyrick, 1887
(Figs 18, 29, 96, 97, 157, 191, 213, 248, 294)

[*Vitessa suradeva* Moore; Pagenstecher, 1886 : 167. Misidentification.]

[*Vitessa pyraliata* Walker; Meyrick, 1886 : 213. Misidentification.]

Vitessa hemiallactis Meyrick, 1887, *Trans. ent. Soc. Lond.* 1887 : 193; Ragonot, 1891 : 110; Hampson, 1896b : 503; Swinhoe, 1900 : 429. LECTOTYPE ♂, NEW GUINEA: Papua, 87·50 Port Moresby (*Mathews*) (genitalia slide no. 8257; BMNH), here designated [examined].

[*Vitessa suradeva* Moore ; Kenrick, 1907 : 75. Misidentification.]

♂, ♀. 42–56 mm. Generally as described for species. Frons orange at base, with extensive blue-black above in ♂, completely orange in ♀. Vertex orange with extensive blue-black admixed. Basal scaling of proboscis blue-black. Thorax above posteriorly tipped with pale yellow; patagium orange with glossy blue-black posteromedially, blue-black more extensive in ♂ than in ♀; tegula mostly glossy blue-black, laterally edged with orange, with more orange medially in ♀ than in ♂. Fore wing above: orange subbasal area from near costa to A_1; broad antemedial fascia widely indented at cell, sometimes finely divided in ♂, medial streaking approaching postmedial fascia; broad postmedial fascia strongly indented at Cu_2, sometimes divided, anterior part broad and rounded, posterior part triangular, more oblique to termen, streaks extending medially but not reaching antemedial fascia; terminal area with vein-lines more extensive in ♀ than in ♂, not reaching postmedial fascia. Hind wing above: black terminal band narrow, sharply demarcated from white medial area; medial area broad, fine black line at anal margin. Fore wing below; postmedial fascia a large oval; apical area with slightly variable number of vein-lines. Hind wing below: apical vein-lines slightly variable.

GENITALIA ♂ (Figs 29, 157, 191, 213). Generally as described for species. Clasper variable in outline.

GENITALIA ♀ (Figs 248, 294). Generally as described for species. Trapezoidal wall of antrum noticeably broadening anteriorly; anterior development of antrum exceeding medial pouch (Fig. 294).

REMARKS. The white markings on the upperside of the wings are more extensive than in other subspecies. The subspecies differs from more easterly subspecies in the less intense metallic gloss of the upperside markings. In markings it is almost indistinguishable from *V. hollandi hollandi* in the *stettina*-group, with which it flies (see also Remarks under *V. stettina* and *V. hollandi*), but the genitalia differ as indicated in the species-group diagnosis, and in the ♀ the posterior margin of the seventh abdominal sternite is convex, not straight or concave as in *V. hollandi*.

BIOLOGY. Early stages and host-plant unknown. Moths collected in most months of the year. Specimens from Waigeo, Camp Nok, are labelled as being diurnal; in the same series one is labelled as being caught at light.

DISTRIBUTION (Fig. 18). Kepulauan Kai; Waigeo; New Guinea.

MATERIAL EXAMINED

Paralectotype. 1 ♀, data as lectotype (genitalia slide no. 15326; BMNH).

Kepulauan Kai: 1 ♂, 1 ♀, Little Kei ('Kai Ketjil'), iv. (*Kühn*) (BMNH). **Waigeo:** 1 ♂, 1 ♀ (*Waterstradt*) (BMNH); 1 ♂ (*Wallace*) (UM, Oxford); 3 ♂, 3 ♀ [2 ♂, labelled diurnal, 1 ♀, labelled at light], Camp Nok, 750 m, v.1938 (*Cheesman*) (BMNH). **New Guinea:** 7 ♀, Irian Jaya, Central Arfak Mts, Ninay Valley, 1050–1100 m, xi.1908–i–iii.1909 (*A. E. Pratt*) (BMNH; CU, Ithaca); 1 ♀, I. J., Arfak Mts, 1200 m, ii–iii.1909 (*C. B. Pratt*) (CMAG, Birmingham); 1 ♀, I. J., Arfak Mts, 1850 m, iii.1910 (*C. B. & F. B. Pratt*) (BMNH); 1 ♀, I. J., Dorey, vi.1897 (*Doherty*) (BMNH); 1 ♀, I. J., Kapaur, xii.1896–i.1897 (*Doherty*) (BMNH); 3 ♀, I. J., Geelwink [sic] Bay, near Wandesi, 1892 (*Doherty*) (BMNH); 2 ♂, I. J., Nomnagihe, 40·23 km south of Wangaar, 600 m, i–ii.1921 (*C. F. & J. Pratt*) (TM, Pretoria); 1 ♀, I. J., Mt Goliath, about 139° Long., 1500 m, iii.1911 (*Meek*) (BMNH); 1 ♀, I. J., River Tor (mouth), 4 km E. of Hol.[landia], Maffen, vii.1959 (*Maa*) (BPBM, Honolulu); 2 ♂, I. J., Maffin Bay, x.1944 (*Ross*) (CAS, San Francisco; CNC, Ottawa); 2 ♀, I. J., Waris, S. of Hollandia, 450–500 m, viii.1959 (*Maa*) (BPBM, Honolulu); 6 ♀, I. J., Humboldt Bay, ix–x.1892 (*Doherty*) (BMNH); 1 ♀, I. J., 1939, ex Guedet collection (CAS, San Francisco); 1 ♀, Papua New Guinea, Telefomin (Eliptamin), 1350–1700 m, vi–ix.1959 (*Brandt*) (ANIC, Canberra); 1 ♂, 6 ♀, P. N. G., Hunstein-Gebirge, Wagu/Black River, ix.1972–iii.1973 (*Hohmann*) (UM, Bremen); 11 ♀, P. N. G., Sepik R., Padwe, x.1957 (*Munroe & Holland*) (CNC, Ottawa); 7 ♂, 65 ♀, P. N. G., Sepik District, Bainyik, 300 m, x–xi.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♂, 1 ♀, P. N. G., Koigin, nr Wewak, 350 m, x.1957 (*Munroe & Holland*) (CNC, Ottawa); 3 ♀, P. N. G., Astrolabe Range, winter, 1917 (*F. P. & W. D. Dodd*) (BMNH); 3 ♂, 6 ♀, P. N. G., Astrolabe Bay (*Wahnes*) (BMNH); 13 ♂, 33 ♀, Finisterre Mts, Wantoat, 1200 m, ix.1957 (*Munroe & Holland*) (CNC, Ottawa); 2 ♀, P. N. G., Western Highlands, Mt Hagen Valley, Keltiga, 1700 m, ix–x.1961 (*Brandt*) (ANIC, Canberra); 1 ♀, P. N. G., Kainantu, 1650 m, x.1959 (*Maa*) (BPBM, Honolulu); 1 ♀, P. N. G., west of Lae, Bubia, sea level, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., Lae, Botanic Garden, 30 m, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., Lae, vi.1951 (*Brandt & Hallstrom*) (ANIC, Canberra); 2 ♀, P. N. G., Busu River, E. of Lae, 0–60 m, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., 8·04 km north-east of Lae, 30 m, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., south side of Markham Valley, Oomsis, 0–30 m, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 12 ♂, 7 ♀, P. N. G., Morobe District, Bulolo, *Araucaria* forest, 1200 m, ix.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., Fly River, Kiunga, vii–x.1957 (*Brandt*) (ANIC, Canberra); 1 ♀, P. N. G., Omati, iii.1952 (*Barnett*) (BMNH); 10 ♂, 9 ♀, P. N. G., Mount Kebea, 1100 m, vii–viii.1903 (*A. E. Pratt*) (BMNH; CMAG, Birmingham); 1 ♀, P. N. G., Ekeikei, 450 m, iii–iv.1903 (*A. E. Pratt*) (BMNH); 1 ♀, P. N. G., Aroa River (*Meek*) (BMNH); 1 ♂, 1 ♀, P. N. G., Lower Aroa R., xi.1904–iii.1905 (*Meek*) (BMNH); 4 ♂, 3 ♀, P. N. G., Port Moresby, Mt Lawes, 400 m, iii–v.1963 (*Brandt*) (ANIC, Canberra); 1 ♀, P. N. G., Central District, Brown R., Karema, sea level, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 1 ♀, P. N. G., Bisianumu, NE. of Port Moresby, 150 m, vi.1957 (*Hardy*) (BPBM, Honolulu); 10 ♂, 18 ♀, P. N. G., Sogeri Plateau, Bisianumu, 500 m, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 59 ♂, 96 ♀, P. N. G., Sogeri Plateau, Mageri, 500 m, viii.1957 (*Munroe & Holland*) (CNC, Ottawa); 6 ♀, P. N. G., Lejo, 15 km WNW – Popondetta, v.1973 (*Hohmann*) (UM, Bremen); 1 ♂, 3 ♀, P. N. G., Hydrographer Mts, 750 m, i–iii.1918 (*Eichhorn Bros.*) (BMNH); 1 ♀, P. N. G., Biagi, Mambare R., 1500 m, iii.1906 (*Meek*) (BMNH); 1 ♀, P. N. G., Amazon Bay area, Dogon, 700 m, ix–xii.1962 (*Brandt*) (ANIC, Canberra); 4 ♀, P. N. G., Milne Bay, xi.1898–ii.1899 (*Meek*) (BMNH); 1 ♀, no data, 600 m (*Barnett*) (BMNH); 1 ♀, no data (*Walsh*) (RNH, Leiden).

The following data are dubious. **Bismarck Archipelago:** 1 ♂, New Britain, Rabaul District (*Verteuil*) (BMNH).

Vitessa hemiallactis admiralitatis subsp. n.

(Figs 19, 37, 98, 99, 158, 192, 249, 295)

♂, ♀. 40–50 mm. Generally as described for species. Frons and vertex orange. Basal scaling of proboscis glossy blue-black. Thorax above: glossy blue-black, posteriorly white-tipped; patagium glossy blue-black, lateral extremities orange; tegula glossy blue-black. Abdomen above: glossy black; grey terminal lines on segments much reduced or absent; terminal segment with orange posterior margin. Fore wing above: ground colour glossy blue-black, basal areas and posterior margin with greenish hue; orange subbasal area small, in ♀ short of costa, reaching to A_1, in ♂ restricted to smaller dot posterior to base of cell; white antemedial fascia very narrow, basally straight, medially diffuse and indented at cell, short of costa and posterior margin; white postmedial fascia oblique, narrowly divided at Cu_2, round anterior spot

slightly larger than triangular posterior spot; terminal area with vein-lines short and restricted, not reaching termen or postmedial fascia, more extensive in ♀. Hind wing above: small black basal area, well demarcated terminal black band, anal margin narrowly black, angled from basal area. Wings below with faint, much reduced apical vein-lines.

Genitalia ♂ (Figs 37, 158, 192). As described for species.

Genitalia ♀ (Figs 249, 295). Generally as described for species. Posterior trapezoidal wall of antrum with lateral margins posteromedially oblique, posterior margin concave; long anterior development of antrum (Fig. 295).

Remarks. This subspecies more closely resembles *V. hemiallactis lustrans* than the nominate subspecies, but differs from *V. h. lustrans* in the less extensive orange markings of the thorax, wing base and subbasal area, the very narrow but generally undivided antemedial fascia of the fore wing and the more extensive development of the terminal white vein-lines. It differs from the nominate subspecies in having the frons and vertex wholly orange, in the less extensive pale markings on the fore wing, and the thicker black terminal band on the hind wing. In the ♂ genitalia the clasper is more irregular in outline than in previous subspecies; in the ♀ genitalia the shape of the antrum is different.

Biology. Early stages and host-plant unknown. Moths collected in April, June, September and October.

Distribution (Fig. 19). Admiralty Islands.

Material examined

Holotype ♂, **Admiralty Islands:** Manus, ix–x.1913 (*Meek*) (BMNH).

Paratypes. **Admiralty Islands:** 2 ♂, 4 ♀ (including allotype), data as holotype (genitalia slide no.'s 15140, 15819; BMNH); 1 ♂, 6 ♀ [no exact data] (*Meek*) (genitalia slide no.'s 14658, 14659, 15820; BMNH); 1 ♀, Manus I., Rossum, 35–125 m, vi.1959 (*Gressitt*) (BPBM, Honolulu); 1 ♂, Los Negros I., iv.1952, (*Brandt & Hallstrom*) (ANIC, Canberra).

Vitessa hemiallactis lustrans subsp. n.
(Figs 19, 100, 101, 159, 193, 250, 296)

[*Vitessa ternatica* Lederer; Pagenstecher, 1900 : 169. Misidentification.]

♂, ♀. 42–54 mm. Generally as described for species and previous subspecies. Frons and vertex dark orange sometimes lightly admixed with black in ♂. Patagium medially glossy blue-black, laterally dark orange, with medial streak of orange in ♀; tegula glossy blue-black, small orange spot anteromedially, larger orange spot on outer margin. Abdomen above glossy black, terminal segment with orange posterior margin. Fore wing above: orange subbasal area large, slightly short of costa, anteriorly extending beyond A_1, of similar size in both sexes; white antemedial fascia narrow, broadly divided, anterior spot minute, subcostal; posterior spot broadly triangular, extending from cell to beyond A_1; white postmedial fascia oblique, broadly divided at Cu_2, round anterior spot larger than triangular posterior spot; terminal area with vein-lines larger and more extensive in ♀ than in ♂, longest on R_5 and M_1, much restricted in ♂, not reaching termen or postmedial fascia. Hind wing above, black band on terminal margin very wide. Wings below with faint, much reduced apical vein-lines, sometimes absent on hind wing in both sexes.

Genitalia ♂ (Figs 159, 193). Generally as described for species. Clasper with free margin deeply concave at centre, basally with high acuminate ridge.

Genitalia ♀ (Figs 250, 296). Generally as described for species. Posterior trapezoidal wall of antrum with posterior margin slightly convex (Fig. 296).

Remarks. This subspecies most closely resembles *V. hemiallactis admiralitatis*; it differs in the ♂ genitalia by the shape of the clasper and in the ♀ by the shape of the posterior wall of the antrum. There is little variation within the Bismarck Archipelago. A specimen from the Rabaul District of New Britain is unlike all others from this area and exactly matches the New Guinea subspecies to which we have referred it; the specimen may be mislabelled or it may represent an accidentally introduced New Guinea individual. We have not seen Pagenstecher's material, collected by Ribbe in New Britain (Neu Pommern), Kinigunang, but it almost certainly belongs to this species

and subspecies. It is possible that the bulk of the Solomon Islands specimens represent a distinct subspecies. The fore wing markings are slightly different from the more northerly material but are also variable over the Solomon Islands range. In the ♂ genitalia the valve is narrower and longer; in an isolated specimen from Florida Island the right cornuti cluster is much reduced, though this may be due to broken-off spines. A description and naming will await the discovery of more ♂ specimens from a range of the islands.

BIOLOGY. Early stages and host-plant unknown. Moths collected in most months of the year.

DISTRIBUTION (Fig. 19). Bismarck Archipelago; Solomon Islands.

MATERIAL EXAMINED

Holotype ♂, **Bismarck Archipelago:** New Hannover, iii.1923 (*Meek*) (BMNH).

Paratypes. **Bismarck Archipelago:** 1 ♀ (allotype), New Hannover, iv.1923 (*Meek*) (BMNH); 5 ♂, 2 ♀, New Hannover, ii–iii.1923 (*Meek*) (genitalia slide no.'s 14660, 14661, 15822, 15825; BMNH).

Material excluded from paratype series. **Bismarck Archipelago:** 1 ♂, 4 ♀, Rooke I. ('Umboi Island'), vii–viii.1913 (*Meek*) (BMNH); 2 ♂, 12 ♀, New Ireland, xi.1923–ii.1924 (*A. F. Eichhorn*) (BMNH; CMAG, Birmingham; TM, Pretoria); 4 ♀, New Britain (*Wahnes*) (BMNH); 3 ♀, New Britain, Talesea, i–iv.1925 (*A. F. Eichhorn*) (BMNH); 1 ♀, New Britain, Keravat, 135 m, xi.1959, at mercury vapour light (*Maa*) (BPBM, Honolulu); 1 ♀, New Britain, Yalom, 1000 m, v.1962 (ZM, Copenhagen); 2 ♀, New Britain, Mt Sinewit, 1050 m, vi–ix.1963 (*Brandt*) (ANIC, Canberra; CNC, Ottawa). [1 ♂, New Britain; see Remarks.] **Solomon Islands:** 2 ♀, Bougainville, Buin, Kukugai Village, x.1960–ii.1961 (*Brandt*) (ANIC, Canberra; CNC, Ottawa); 8 ♂, 9 ♀, Guizo ('Gizo Island'), xi.1903 (*Meek*) (BMNH; CNC, Ottawa; NMNH, Washington); 1 ♂, Florida, i.1901 (*Meek*) (BMNH); 1 ♀, Guadalcanal, Betikama R., viii–x.1960 (*Brandt*) (ANIC, Canberra).

Vitessa intermedia sp. n.

(Figs 20, 102, 103, 160, 194, 251, 297)

♂, ♀. 50–60 mm. Frons and vertex orange, admixed with black in ♂; scaling of vertex forming strong crest. Eye brownish fuscous. Ocellus minute, brown. Chaetosema with pale yellowish setae. Antenna black, anterior surface of scape basally orange; posterior surface with basal half of apical third of shaft white. Labial palpus: first segment orange; second segment orange, distally black; third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis black, sometimes laterally admixed with orange. Neck region orange. Thorax above: anteriorly orange, medially blue-black, posteriorly white admixed with yellow; patagium orange with posteromedial glossy blue-black spot; tegula orange with anterolateral glossy blue-black spot and posteriorly admixed with black. Abdomen above matt black, posterior margins of segments whitish grey, posterior half of terminal segment and anal tuft orange. Body below blue-black with oblique white bands; pectus orange; whitish grey abdominal lines broader than above, posterior half of terminal segment and anal tuft orange. Legs blue-black; greenish hue on fore coxa; white on ventral surfaces of femora; medial white band on mid tibia; white at tips of tibiae and ventral surfaces of tibial spurs. Fore wing above: orange subbasal area large with narrow subcostal streak to base, basal blue-black spot partially demarcated, orange short of costa and posterior margin; glossy blue-black subbasal fascia with greenish hue; whitish grey transverse fasciae with pale greenish hue, antemedial and postmedial fasciae wide, medially diffuse, irregularly joining, usually both fasciae slightly short of costa and posterior margin; medial blue-black fascia reduced to two irregularly shaped patches, or, more rarely, a single longitudinally triangular spot on cell; terminal area wide, greenish white vein lines thick on all veins, most lines joining postmedial fascia and termen, completely merging in costal region; fringe dark grey. Hind wing above: broad black terminal band violaceous, gradually tapering from costa, acuminate at anal margin, close to infuscation from wing base, anal margin edged with black; white medial area large, oval; fringe dark grey, distally white near apex. Fore wing below: black, weakly violaceous; retinaculum light grey; a single large, oval postmedial fascia, in ♂ extending to near posterior margin, in ♀ hardly passing Cu_2; terminal area with apical white vein-lines, posteriorly shorter and weaker; posterior margin white; fringe as above. Hind wing below: much as above, long white vein-lines near costa and apex, small vein-lines on posterior part of termen; fringe as above.

GENITALIA ♂ (Figs 160, 194). As described for *V. hemiallactis*, but see Remarks.

GENITALIA ♀ (Figs 251, 297). As described for *V. hemiallactis*, but see Remarks.

REMARKS. This species is externally almost identical with the sympatric *V. stettina*, which also has very broad white fasciae on the fore wing, but differs by having the fasciae converging on the

medial area and fusing; its genitalia are very distinct. *V. intermedia* flies over the same range of altitudes as *V. stettina*, though it appears to be more common in the upper part of its range than in the lower, where it is largely replaced by *V. hemiallactis*. The paratype series includes ♂ and ♀ paralectotypes of *V. stettina*, from which Swinhoe failed to distinguish the present species. *V. intermedia* closely resembles the Australian *V. glaucoptera* in appearance and general structure; one ♂ from Avola, Papua, has wing markings almost identical with those of *V. glaucoptera*, but represents an extreme of variation. *V. intermedia* differs from *V. barretti*, which overlaps the upper part of its altitude range, by the smaller size, smaller orange subbasal area, less completely fused fasciae, thinner vein-lines, merging only slightly in the costal region; in the ♂ genitalia the posteroventral angle of the valve is less extended; in the ♀ genitalia the posterior development of the trapezoidal wall of the antrum is longer but narrower (Fig. 297). *V. intermedia* closely resembles *V. hemiallactis hemiallactis* but has larger wing markings; the ♂ genitalia have a larger valve and a more extended posteroventral angle; the ♀ genitalia most closely resemble those of *V. hemiallactis lustrans*. In external and genital characters this species is intermediate between *V. hemiallactis* and *V. barretti* and, apart from the latter species, is the largest species in the *hemiallactis*-group.

Biology. Early stages and host-plant unknown. Moths collected in February, March, June and August.

Distribution (Fig. 20). New Guinea: Papua New Guinea.

Material examined

Holotype ♂, **New Guinea:** Papua, Biagi, Mambare R[iver], 1500 m ('5000 ft'), ii.1906 (*Meek*) (genitalia slide no. 15311; BMNH).

Paratypes. **New Guinea:** 1 ♀ (allotype), Papua New Guinea, data as holotype, iii.1906 (genitalia slide no. 15347; BMNH); 1 ♂, P. N. G., Granville ('Port Moresby') [paralectotype of *Vitessa stettina* Swinhoe] (genitalia slide no. 8259; BMNH); 1 ♂, P. N. G., Granville, 6845 (genitalia slide no. 15309; BMNH); 1 ♂, P. N. G., Milne Bay, 20.viii.1903 (*Meek*) (genitalia slide no. 15340; BMNH); 1 ♀, P. N. G., Mount Kebea, 1100 m ('3600 ft'), vi.1903 (*A. E. Pratt*) [paralectotype of *Vitessa stettina* Swinhoe] (genitalia slide no. 15346; BMNH); 1 ♀, P. N. G., Foula, 1350 m ('4500 ft'), viii.1903 (*A. E. Pratt*) (genitalia slide no. 15348; BMNH); 8 ♂, 1 ♀, P. N. G., Avola, 1850 m ('6000 ft'), viii.1903 (*A. E. Pratt*) (genitalia slide no.'s 14718, 15310, 15313, 15316, 15319, 15339, 15341 [1 ♂, 1 ♀, abdomens missing]; BMNH).

Vitessa barretti sp. n.
(Figs 20, 104, 105, 161, 252, 298)

♂, ♀. 58–63 mm. Frons and vertex unusually narrow, orange. Eye and ocellus fuscous. Chaetosema with pale yellowish setae. Antenna black; dorsal scaling on basal half of apical third of shaft white. Labial palpus mainly black with considerable orange admixture dorsolaterally and ventrally. Maxillary palpus basally black, distally orange. Basal scaling of proboscis black. Neck region orange. Thorax above black, anteriorly orange; patagium orange with large medial glossy blue-black spot; tegula orange with antero-lateral glossy blue-black spot. Abdomen above black, posterior margins of segments narrowly white; anal tuft orange. Body below black, abdomen as above; thorax and legs black with extremely restricted areas of white. Fore wing rather wide; above: orange subbasal area large, reaching posterior margin; narrow subcostal streak to base, partially demarcating basal blue-black spot; very narrow glossy blue-black subbasal fascia; antemedial and postmedial greyish green fasciae completely fused, reaching costa and posterior margin, medial fascia a small, longitudinal, triangular, blue-black streak in cell; thick greyish green vein-lines in terminal area, all merging with postmedial fascia, especially at costa, blue-black streaks between lines; fringe basally black, distally pale grey. Hind wing above: broad black terminal band violaceous, inner margin angled from M_1 to Cu_2, abruptly narrowing then tapering to anal margin; deep infuscation from base; white medial area oval, reaching anal margin; fringe basally fuscous, distally white. Fore wing below: black; single, small, irregularly ovate, white postmedial fascia in ♂ with diffuse white distally in cubital area; subterminal whitish grey vein-lines; fringe basally blackish fuscous, distally paler. Hind wing below: like upperside; white vein-lines apically and terminally.

Genitalia ♂ (Fig. 161). Generally as described for *V. hemiallactis*. Large valve distally subtruncate; termen narrowly rounded; base of uncus fairly wide.

Genitalia ♀ (Figs 252, 298). As described for *V. hemiallactis*.

REMARKS. This species resembles *V. griseata* in the almost unicolorous medial area of the fore wing, but is distinguished by the black medial streak on the fore wing and the white medial area on the hind wing, as well as by genitalia (see diagnoses of the *griseata*- and *hemiallactis*-groups). This species is distinguished from *V. stettina* by the loss of much of the black pattern of the fore wing, and by the group characters of the genitalia; it shows similar pattern differences from *V. intermedia* and also has the orange subbasal area larger; the ♂ genitalia, though almost identical with those of *V. intermedia*, have the posteroventral angle of the valve more extended; in the ♀ genitalia the posterior development of the trapezoidal wall of the antrum is shorter but broader (Fig. 298). This species, however, is most easily confused with *V. glaucoptera* from Australia, which has almost identical wing markings and genitalia; it is distinguished by the much larger size and by having the black streak between M_1 and M_2 of the fore wing more constricted at junction with fasciae and the black streak in the cell longer; the genitalia are correspondingly larger. Though the members of the *hemiallactis*-complex in New Guinea and Australia are closely related to one another, it seems best at present to consider *V. hemiallactis*, *intermedia*, *barretti* and *glaucoptera* different species. We take pleasure in dedicating the present species to Mr J. Barrett, collector of the holotype.

BIOLOGY. Early stages and host-plant unknown. Moths collected in February and September, at altitudes from 600 to over 1800 m.

DISTRIBUTION (Fig. 20). New Guinea: Papua New Guinea, in the central mountains.

MATERIAL EXAMINED

Holotype ♂, **New Guinea:** North-east New Guinea, Western Highlands, Mt Hagen, 22.ix.1951 (*Barrett*) (genitalia slide no. DK 78; CNC, Ottawa).

Paratypes. **New Guinea:** 1 ♀ (allotype), Papua New Guinea, Eastern Highlands, Aiyura, 27.ix.1957 (*Munroe & Holland*) (genitalia slide no. DK 79; CNC, Ottawa); P. N. G., 1 ♀, Gurukor, 600 m, 10–12.ii.1978 (Hébert) (CNC, Ottawa).

Vitessa glaucoptera Hampson, 1906
(Figs 20, 106, 107, 162, 195, 253, 299)

Vitessa glaucoptera Hampson, 1906, *Ann. Mag. nat. Hist.* (7) **17** : 216. Holotype ♂, AUSTRALIA: Queensland, Cedar Bay, s[outh] of Cooktown (*Meek*) (genitalia slide no. 8258; BMNH) [examined].

♂, ♀. 34–52 mm. [Holotype 46 mm, incorrectly given by Hampson as 30 mm.] Frons orange; vertex orange admixed with dark grey. Eye and ocellus brown. Chaetosema with pale yellowish setae. Antenna black; base of scape orange; dorsal scaling of basal half of apical third of shaft white. Labial palpus: first two segments orange, third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis black, laterally orange, orange admixed dorsally. Neck region orange. Thorax above orange, with large central blue-black spot; patagium orange with small posteromedial glossy blue-black spot; tegula orange, distally admixed with black, small anterolateral glossy blue-black spot. Abdomen above: matt black, posterior margins of segments narrowly white, terminal segment with posterior margin and anal tuft orange. Body below blue-black; pectus orange; legs blue-black with dark green hue; white bands on mid and hind coxae; white on ventral surfaces of mid and hind femora; medial white band on mid tibia; tibiae white-tipped; tibial spurs dorsally white; abdomen with white margins broader than above. Fore wing above: orange subbasal area large, with narrow subcostal streak to base; basal blue-black spot partially demarcated; orange sometimes reaching posterior margin in ♀; narrow glossy blue-black subbasal fascia; greyish green antemedial and postmedial fasciae almost completely fused, reaching costa and posterior margin, small broadly triangular blue-black spot in cell, sometimes with small black subcostal streak above and diffuse black patch below in cubital area; thin greyish green vein-lines in terminal area, on M_1 and M_2 slightly short of fasciae, sometimes also on *CuP*; fringe basally dark grey, distally light grey. Hind wing above: broad black terminal band violaceous, broad at apex, basal margin angled from M_1 to Cu_2, abruptly narrowing and tapering to anal margin; fringe basally dark grey, distally white. Fore wing below: black; single, small, irregularly ovate, white postmedial fascia, diffuse in cubital region; scattered white scales along costa; posterior margin white; fine, small, white apical vein-lines; fringe as above. Hind wing below as above; small, faint, white apical vein-lines.

GENITALIA ♂ (Figs 162, 195). Generally as described for *V. hemiallactis*. Posteroventral angle of valve broadly rounded, valve narrow.

GENITALIA ♀ (Figs 253, 299). As described for *V. hemiallactis*.

REMARKS. In general as in Remarks for *V. barretti*. The greenish colour of the fore wing led Swinhoe to associate *V. stettina* with the present species, but the two are not closely related. The independent acquisition of the same colour by the Australian *V. zemire nephritica* suggests adaptation to a common environmental factor, and can be compared to the parallel acquisition of a similar greenish colour by *V. barretti* and the unrelated *V. griseata* in the highlands of New Guinea. Though externally *V. glaucoptera* most closely resembles *V. barretti*, in size and fore wing markings it is also comparable to *V. intermedia* (see Remarks under *V. intermedia* for Avola specimen). The ♂ genitalia lack the extended posteroventral angle of the valve seen in *V. intermedia* and *barretti*; the valve is most like that of *V. hemiallactis hemiallactis* but narrower; the ♀ genitalia are also most like those of that subspecies.

BIOLOGY. Early stages and host-plant unknown. Moths collected in March, September, November and December.

DISTRIBUTION (Fig. 20). Australia: Queensland.

MATERIAL EXAMINED

Australia: 1 ♀, Queensland, Cedar Bay, south of Cooktown (*Meek*) (BMNH); 1 ♀, Q., Evelyn Scrub [145°27′ E, 17°30′ S], xi.1910 (*Dodd*) (ANIC, Canberra); 3 ♂, 1 ♀, Q., Kuranda, iii, ix, xii.1904, iv.1905 (*Dodd*) (ANIC, Canberra); 1 ♂, 7 ♀, Q., Kuranda, n. Cairns 1910 (*Dodd*) (BMNH); 2 ♂, 13 ♀, Q., 17·6 km south of Ravenshoe, 800 m, iii.1964 (*Common & Upton*) (ANIC, Canberra; CNC, Ottawa); 2 ♂, 7 ♀, Q., Mt Lewis, 12·8 km north-west of Mt Molloy, 800 m, iii.1964 (*Common & Upton*) (ANIC, Canberra); 3 ♂, 2 ♀, Q., 4·8 km west of Mossman, iii.1964 (*Common & Upton*) (ANIC, Canberra); 1 ♀, Q., 27 km ('17 mls') south of Atherton, 915 m, iii.1964 (*Common & Upton*) (ANIC, Canberra).

Vitessa cristobalensis sp. n.
(Figs 2, 108, 254, 300)

♂. Unknown.

♀. 38 mm. Frons orange. Vertex orange with central admixture of black. Eye and ocellus black. Chaetosema with pale yellowish setae. Antennae black, base of scape orange; dorsal scaling of basal half of apical third of shaft white. Labial palpus: first two segments orange, third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis glossy blue-black. Neck region orange. Thorax above: glossy blue-black, laterally edged and posteriorly tipped with orange; patagium glossy blue-black, laterally tipped with orange; tegula glossy blue-black with anteromedial and outer lateral edges finely orange. Abdomen above black (markings not recorded). Body below blue-black; pectus orange; legs black, mid and hind coxae banded with white, posterior surfaces of mid and hind femora white, mid tibia with medial white band, mid and hind tibiae tipped with white. Fore wing narrow; above: ground colour glossy blue-black with dark green hue; orange subbasal area small, restricted between stem of *R* and *CuP*; faintly greenish white antemedial fascia narrow, deeply indented medially at cell by wedge of ground colour, anterior portion triangular, posterior part oblong and larger, narrowly separated from costa and posterior margin; greenish white postmedial fascia divided into two spots, large oval anterior spot over discocellular vein, extending from stem of *R* to Cu_2, posterior spot far distad of anterior, narrowly triangular, spanning *CuP*; terminal area with narrow greenish white vein-lines extending from termen, well short of oval spot of postmedial fascia, but nearly touching posterior triangular spot; fringe glossy, basally dark grey, distally pale grey. Hind wing above: broad blue-black terminal band violaceous, very broad from infuscated costa, commencing from upper end of cell, sharply angled to just beyond Cu_2, continuing narrowly and parallel to margin, finely upturned and ending at anal margin; anal margin finely edged with black; white medial area roughly rectangular; fringe basally dark grey, distally white, anal angle black. Fore wing below: blue-black, weakly violaceous, shading to brownish grey and admixed with white at posterior margin; retinaculum light grey; postmedial fascia diffuse, oblique, narrowly oval, white; white vein-lines in terminal area weak and shorter than above; fringe dark grey. Hind wing below as above, fringe mostly white; weak, short apical and terminal vein-lines extending to Cu_2, joining fringe.

GENITALIA ♀ (Figs 254, 300). High, dorsally fused, posteriorly narrow and produced ovipositor lobes; surface densely setose, larger setae on margin, spiny setae easily visible at ×100 magnification. Posterior apophysis short, slightly curved. Anterior apophysis longer, thicker, inwardly curved at tip. Posterior ostial sclerite (Fig. 300) very wide with long lateral prolongations anteriorly directed, medial portion

narrow with anterior margin recurved, thickened, forming broad short flap; posterior margin broadly concave; anterior sclerite very wide, short, with recurved and slightly wrinkled ventral margin, minutely denticulate, bearing small weakly developed medial pouch; very broad trapezoidal wall of antrum extending posteriorly between lateral prolongations of posterior sclerite, laterally acutely angled, posterior edge half width of anterior sclerite, antrum anteriorly produced for shorter distance and narrowing; base of ductus seminalis mostly free of sclerotization; ductus bursae slightly expanded posteriorly, remainder of ductus narrow, minutely spinose; corpus bursae comma-shaped, bearing small, paired, denticulate areas.

REMARKS. This is distinguished from all other species and subspecies with narrow, wholly or partly divided white fascia by having the antemedial fascia almost and the postmedial fascia clearly divided into two spots, in combination with the following characters: terminal area with all veins bearing long white vein-lines, nearly touching posterior spot of postmedial fascia; much reduced orange subbasal area. This species most closely resembles *V. hemiallactis lustrans*, but is distinguished by longer vein-lines of the fore wing, the greater width of the antrum and the shape of the corpus bursae.

BIOLOGY. Early stages and host-plant unknown. Holotype collected at black light.

DISTRIBUTION (Fig. 2). Solomon Islands: San Cristobal Island.

MATERIAL EXAMINED

Holotype ♀, **Solomon Islands:** San Cristobal, Warahito–Pogato confluence, 1965, at black light (genitalia slide no. 14263; BMNH).

The *pyraliata*-group

DIAGNOSIS. Pectinations of ♂ antennae larger than in other species-groups. Wing markings similar to those of *stettina*- and *hemiallactis*-groups, but with pale markings of fore wing relatively restricted in most species. Hind wing markings very varied, in *V. nicobarica* ♂ all dark markings absent, in ♀ white area heavily infuscated; in *V. pyraliata* similar infuscation, but in some subspecies with a very wide terminal band, well demarcated from the white medial area, as also in *V. kolakalis* and *V. sulaensis*; in *V. muluana*, *V. gemina* and *V. splendida* the terminal band narrow, as in *plumosa*- and *suradeva*-groups. ♂ genitalia with basal portion of uncus wide, distal portion rod-like, down-turned then up-curved, with laterally directed setae. Valve of moderate width, shape somewhat similar to that of *hemiallactis*-group, but narrower, clasper coarsely serrated basally and with tooth-like ridges on posterior margin, not finely serrulate as in *hemiallactis*-group. ♀ genitalia with very large ostial chamber; posterior sclerite wide, medial section narrowed but with produced medial or lateral portions; lateral section of sclerite anteriorly elongated, in *V. muluana* with an oblique raised ridge. Anterior sclerite broad, ventrally narrow, antrum very well-developed anteriorly, posterior development similar to that of *hemiallactis*-group. Ostial sclerotization relatively larger than in *stettina*- or *hemiallactis*-groups, smaller and less regular than in *suradeva*-group. Corpus bursae with either fine paired denticulate areas or heavily sclerotized, depressed, paired denticulate signa.

REMARKS. Four of the species assigned to this group are known only from the ♀. When the ♂ characters are known some of these species may require reassignment or the definition of the species-group may have to be revised.

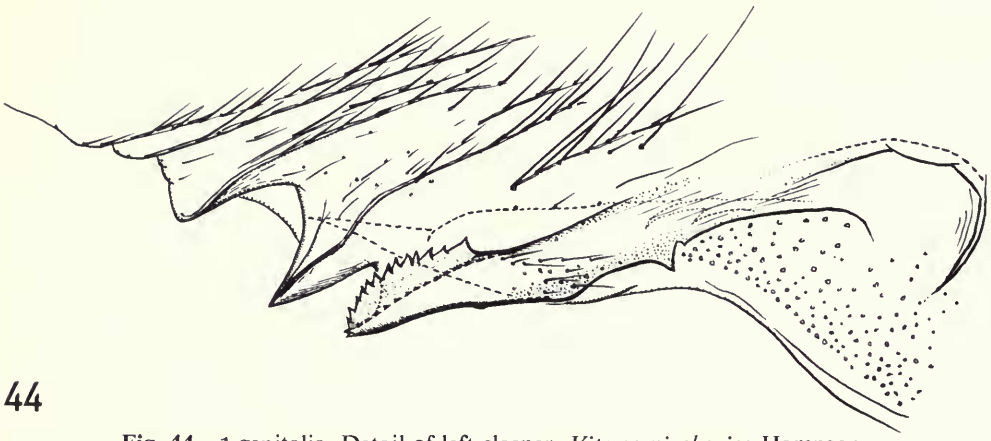
Vitessa nicobarica Hampson, 1896
(Figs 21, 44, 109, 110, 163, 214, 255, 301)

Vitessa nicobarica Hampson, 1896*a*, *The Fauna of British India, including Ceylon and Burma*. Moths **4** : 146. LECTOTYPE ♂, NICOBAR ISLANDS: Nancowry, Moore coll. 94–106 (genitalia slide no. 8268; BMNH), here designated [examined].

Vitessa nicobarica Hampson; Hampson, 1896*b* : 503.

♂, ♀. 44 mm (all specimens damaged). Frons, vertex (from remaining scales) orange. Eye, ocellus black. Chaetosema with pale yellowish setae. Antenna black, base of scape orange (at least in ♀; terminal segments lost). Labial palpus blue-black; base of first segment orange; tip of third segment fuscous. Maxillary palpus basally black, distally orange. Basal scaling of proboscis black. Neck region orange. Thorax above: orange with large central blue-black spot; patagium blue-black laterally tipped with orange; tegula orange, with broad, oblique, blue-black band. Abdomen above: ochreous buff, anal tuft orange.

Body below: pectus orange; thorax blue-black; legs black, possibly with some white on coxae (legs mostly damaged or missing); abdomen blackish fuscous, posterior margins of segments whitish buff, pale bands progressively wider on the posterior segments, anal tuft orange. Fore wing narrow, costa convex; above (very worn): ground colour blue-black; orange subbasal area more restricted in ♂, short of costa, reaching to A_1, in ♀ extending past A_1, subcostal streak to base partially demarcating blue-black basal spot; narrow white antemedial fascia divided into two spots at cell, smaller triangular anterior spot, larger, rectangular, medially diffuse posterior spot, short of posterior margin, fascia more restricted in ♂; broader white postmedial fascia, divided into two primary spots, anterior spot over discocellular vein, entire, large, oval, short of costa, posterior spot more distal, triangular, divided into four smaller short streaks by black lines on veins Cu_1, Cu_2 and A_1, reaching posterior margin in ♀, in some specimens a trace of an additional black line on *CuP*; posterior white marking absent in ♂; terminal area with short, thin apical and terminal white vein-lines, short of termen and postmedial fascia, extending to Cu_2 in ♀, very much weaker in ♂; fringe dark grey. Hind wing above: in ♂ uniformly pale yellow with isolated black scales at apex, in ♀ costa black narrowly edged with white, termen black, narrow, diffuse, more strongly black for short distances on M_3, Cu_1 and Cu_2, medial area broadly white to anal margin; fringe white, basally admixed with black towards apex. Fore wing below: in ♂, costa narrowly black, apex and termen triangularly black to tornus, slight black admixture from base weakly spreading over cell; remainder of wing and retinaculum pale yellow; fringe black slightly admixed with yellow at tornus; in ♀ white postmedial fascia visible as a broad L-shape broken by black vein-lines as above, fascia very diffuse, posterior margin and retinaculum light grey, remainder of wing black, weakly violaceous. Hind wing below: in ♂ mainly pale yellow with black at base along veins, large black apical patch weakly extended down part of termen, costa and fringe pale yellow; in ♀ exactly like upperside but weakly violaceous.



44

Fig. 44 ♂ genitalia. Detail of left clasper. *Vitessa nicobarica* Hampson.

GENITALIA ♂ (Figs 44, 163, 214). Uncus slender, basal portion flattened, laterally constricted, foramen posteriorly acuminate, terminal portion narrow, decurved then up-turned with sparse, long, laterally directed setae, tip broadly pointed. Gnathos with widely arched lateral arms and compressed, relatively short, talon-shaped medial process, tip finely acuminate. Transtilla broadly arcuate, medially widened. Tegumen with posterior sclerite broad and rounded, anterior sclerite widely emarginated medially. Vinculum broad, anteriorly slightly concave. Valve narrow, costa narrowly inflated, apex acutely rounded, distal margin weakly excised below middle, mesal surface with fine oblique converging striations; clasper (Fig. 44) a long diagonal ridge with basal curved carina, base of ridge edged with a few points, continuing to form three tooth-like, medially ridged processes, diminishing in size towards distal margin of valve, smaller ridges merging with mesal striations; largest process bearing raised serrulate ridge. Juxta with large narrow lateral sclerites, ventral process long, flat, narrow, up-turned, supporting base of anellus, dorsal process shorter, broader, bearing setae, connected directly to sclerotized longitudinally ridged narrow plates supporting sides of anellus; between sclerites and connected medially, a catena divided into two large, narrow, heavily sclerotized ridges, distally spined and medially separated, basally rounded, connected by a lightly sclerotized wrinkled element (area damaged); manica supported by lightly sclerotized bands (anellus not everted in slide preparations). Aedeagus long, distally expanded, base narrowly rounded; ductus ejaculatorius subbasal; vesica with spines spreading ventrally to distal end of

aedeagus, here membrane bulbous and transversely rugose; between cornuti clusters vesica longitudinally rugose and sclerotized at point of reflexion, probably making an elbow-shaped angle (vesica not properly everted in slide preparations); cornuti (Fig. 214) in three clusters, two proximal dorsolateral clusters of same size bearing large spines, one distal ventrolateral cluster bearing smaller spines.

GENITALIA ♀ (Figs 255, 301). High, posteriorly narrow and produced ovipositor lobes, dorsally fused; surface densely setose, larger setae on margin, spiny setae easily visible at ×100 magnification. Apophyses fairly short, slender, weakly curved; anterior apophysis longer and thicker than posterior apophysis. Posterior ostial sclerite (Fig. 301) wide with short lateral prolongations anteriorly directed, medial portion prolonged with short constricted base, posterior margin rounded and medially emarginate; anterior sclerite wide with ventral margin short, recurved, slightly wrinkled and laterally denticulate; very long dorsal wall of antrum extending with curved margin to base of medial prolongation of posterior sclerite, anteriorly protruded and funnel-shaped; ductus seminalis arising at junction of antrum with swollen base of ductus bursae, remainder of ductus bursae narrow, anteriorly spinose; corpus bursae oval, bearing minute paired denticulate areas.

REMARKS. Despite the unusual lithosiid-like external appearance of this species, it is close in genital structure to *V. pyraliata*. It is distinguished by the rounded costa of the fore wing and in the ♂ by the yellow hind wing devoid of a dark terminal band; also on the underside of the hind wing by the black triangular apical marking; the ♀ hind wing is more typical, but has a large white medial area and diffuse black markings. The ♂ genitalia are distinguished by the smaller talon-shaped gnathos, the narrower valve and the arrangement of ridges and points on clasper, with very distinctive serrulate ridge on basal process; the divided catena is unique; in the ♀ genitalia the shape of the sclerites in the ostial chamber is distinctive.

BIOLOGY. Early stages, host-plant, and season of flight unknown.

DISTRIBUTION (Fig. 21). Nicobar Islands.

MATERIAL EXAMINED

Paralectotypes. **Nicobar Islands**: 1 ♀, data as lectotype (genitalia slide no. 13168; BMNH); 1 ♂, Great Nicobars, 873 (genitalia slide no. 14682; BMNH).

Vitessa pyraliata Walker, 1864

(Figs 14, 21, 22, 30, 38, 41, 111–116, 164–166, 196, 197, 256–258, 302–304)

Vitessa pyraliata Walker, 1864 : 220.

♂, ♀. 46–58 mm. Frons: ♂ black lightly admixed with orange, ♀ orange, laterally black. Vertex: ♂ matt black lightly admixed with orange, ♀ orange lightly admixed with black. Eye, ocellus black. Chaetosema with pale yellow setae. Antenna black, base of scape in ♀ orange, dorsal scaling of apical third of shaft white, last several segments black. Labial palpus: ♂, first segment orange, second segment black or admixed with orange, third segment black; ♀, first segment dorsally black, ventrally orange, second segment black laterally streaked with orange to near tip, third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis glossy blue-black. Neck region orange. Thorax above: glossy blue-black, anteriorly bordered with variable amounts of orange, posteriorly tipped with white; patagium glossy blue-black, laterally and sometimes medially edged with variable amounts of orange; tegula glossy blue-black, laterally edged with variable amounts of orange. Abdomen above: black, posterior margins of segments with variable amounts of white, terminal segment posteriorly finely bordered with orange, anal tuft orange, medially brown. Body below: black; pectus orange; white abdominal lines broad, posterior margin of terminal segment and anal tuft orange. Legs black, white markings mostly on mid and hind legs; fore coxa black or black streaked with orange. Fore wing above: ground colour blue-black, fresh specimens with dark green hue; orange subbasal area variable, in ♂ restricted to small spot at base of cell, sometimes with orange scaling forming a weak subcostal streak, in ♀ sometimes large with broad subcostal streak continuing to base and joining white spot sometimes present at base of posterior margin, partially demarcating basal black spot; white antemedial fascia narrow, divided at cell into two spots, in ♂ anterior spot sometimes reduced to minute speck, posterior spot rectangular or triangular, not reaching posterior margin; white postmedial fascia oblique, divided at Cu_2 into two spots, large anterior spot circular, over discocellular vein, not reaching costa, posterior spot triangular in ♀, minute in ♂, sometimes with smaller spot anterior to it in ♀; terminal area with weak white vein-lines, sometimes absent in ♂; fringe basally dark grey, distally light grey. Hind wing above varying with subspecies; black terminal band broad, weakly

violaceous; infuscation from base sometimes extending across wing, almost obliterating white medial area, otherwise white medial area broadly reaching anal margin; fringe dark grey, distally white at apex and part of termen. Fore wing below: in ♂ dark brown with shaggy scaling, in ♀ blue-black, violaceous, partly with dark green hue, smoothly scaled, brownish fuscous in cubital region; in both sexes postmedial fascia as above, or with spots fused, white streak along anal fold; apical white vein-lines weakly developed in ♀, sometimes absent as in ♂; posterior margin white; retinaculum light grey. Hind wing below: ground colour as on fore wing, markings as above, apical vein-lines in ♀ weak or absent, in ♂ absent.

GENITALIA ♂ (Figs 30, 38, 41, 164–166, 196, 197). Generally as described for *V. nicobarica*. Uncus: marginal setae very long. Gnathos long, strongly curved, sickle-shaped. Transtilla V-shaped. Anterior sclerite of tegumen with long narrow medial emargination on anterior margin. Vinculum broad, anteriorly concave. Valve narrow, costa upturned to apex, apex narrowly rounded, termen broadly rounded, slightly oblique, ventral margin weakly excised below middle; clasper variable, a long diagonal ridge, basal part with cluster of short spines, remainder produced into three or four tooth-like, medially ridged processes of irregular size, those on ventral margin smallest and merging with mesal striations. Catena (Fig. 38) single, large, long, basally constricted, medially sulcate, tips diverging, varying in width posteriorly with multiple short spines, catena slightly separated from lateral ridged sclerites attached to dorsal processes of juxta (Figs 30, 196, 197). Aedeagus with strong sclerotization at junction with vesica, forming acute elbow-joint when vesica everted and reflexed (Fig. 41); vesica bearing three cornuti clusters, two large proximal dorsolateral clusters, one small distal ventrolateral cluster.

GENITALIA ♀ (Figs 256–258, 302–304). Generally as described for *V. nicobarica*. Posterior ostial sclerite (Figs 302–304) wide with short triangular lateral prolongations anteriorly directed, medial portion of anterior margin prolonged into a V-shaped flap with rounded upturned tip. Anterior sclerite with ventral margin short, recurved, slightly wrinkled and laterally denticulate; antrum posteriorly extending to anterior margin of posterior sclerite, medially narrowed and joined to base of upturned flap; anteriorly extending into large cup-shaped chamber. Ductus seminalis arising from base of antrum; ductus bursae slightly widened posteriorly, remainder of ductus narrow, anteriorly spinose; corpus bursae oval bearing minute denticulate areas, these sometimes absent.

REMARKS. This species is related to *V. nicobarica*, but is distinguished by possessing typical black and white hind wing markings in both sexes. It is variable over its range but the two subspecies *V. pyraliata latialbata* and *V. pyraliata pyraliata* are distinguished in the genus by a predominantly black and white appearance due to great reduction in all pale markings, especially on the fore wing and the undersides of both wings; the nominate subspecies from Sulawesi is best distinguished from *V. kolakalis*, from the same island, by the reduced orange subbasal area, by the rough underside scaling of the ♂ and by the genital characters of both sexes. The subspecies *V. pyraliata triangulifera* can easily be confused externally with *V. philippina* of the *stettina*-group, but is distinct on genital characters (see Diagnoses of the species-group, pp. 286, 303). Other species in the *pyraliata*-group are distinguished by their more extensive pale fore wing markings and by genital characters. We recognize three subspecies, from the following geographical areas: (1) Burma, Malaya, Sumatra, Java, Natuna Island, Borneo and western central Sulawesi; (2) Philippines; (3) south and south-western Sulawesi and Flores.

BIOLOGY. Early stages and host-plant unknown. Moths collected in all months of the year.

DISTRIBUTION (Figs 14, 21, 22). Burma; Malaya; Sumatra; Java; Natuna Island; Borneo; Philippines; Sulawesi; Flores.

Vitessa pyraliata latialbata subsp. n.
(Figs 21, 30, 38, 111, 112, 164, 196, 256, 302)

♂, ♀. 46–58 mm. Generally as described for species. Labial palpus: in ♂ second segment laterally admixed with orange; in ♀ mostly orange. Patagium: in ♂ mostly blue-black, laterally and medially edged with orange; in ♀ orange with posteromedial blue-black spot; tegula: in ♂ blue-black with inner and outer edges finely orange; in ♀ more distinctly orange with anterolateral and posterior blue-black spot. Legs in ♂ black with mid and hind tibiae bearing small dorsal white spot and distally tipped with white; in ♀ most of fore coxa orange, ventral margins of mid and hind femora white, mid and hind tibiae medially banded with white, tibiae and tibial spurs distally tipped with white. Fore wing above with variable orange subbasal area, in ♂ restricted between posterior margin of cell and A_1, with faint orange scaling or

defined subcostal streak continuing to base; in ♀ orange area larger, subcostal streak stronger. White antemedial fascia with fairly well-defined anterior spot and large rectangular posterior spot. White postmedial fascia sometimes with faint white scales behind posterior spot in ♀. Hind wing above with broad, well demarcated, blue-black terminal band, acutely angled and narrowing at Cu_2; infuscation from base weak, medial white area broadly extended to anal margin. Fore wing below with postmedial fascia diffusely fused into large oval in ♂, spots separate with slight diffusion in ♀.

GENITALIA ♂ (Figs 30, 38, 164, 196). Generally as described for species. Clasper with three or four tooth-like processes, largest being second from base.

GENITALIA ♀ (Figs 256, 302). As described for species.

REMARKS. This is distinguished from other subspecies by the very large white area of the hind wing, and the correspondingly minute amount of infuscation from base and costa. It is easily distinguished from *V. teleroma* of the *suradeva*-group, also from Malaysia, by the larger pectinations of the ♂ antenna; the smaller orange subbasal area and white antemedial fascia on the fore wing; the broader black terminal band on the hind wing; the rough scaling on the underside of the wings in the ♂; and by genital characters (see species-group diagnoses, pp. 303, 317). The subspecies is slightly variable over its considerable range. The arrangement of spines and processes on the clasper of the ♂ genitalia is somewhat variable. The data labels of Ceylon [Sri Lanka] and Australia on two specimens are dubious.

BIOLOGY. Early stages and host-plant unknown. Moths collected from January to July, September, November and December.

DISTRIBUTION (Fig. 21). Burma; Malaya; Sumatra; Java; Natuna Island; Borneo; western central Sulawesi.

MATERIAL EXAMINED

Holotype ♂, **Malaya:** Maxwell Hill [4°52′ N, 100°48′ E], 13.ix.1929 (*Corbet*) (BMNH).

Paratypes. **Malaya:** 1 ♂, Penang, 1896 (*Curtis*) (genitalia slide no. 15832; BMNH); 1 ♂, Pulo Penang ('Penang Island'), ex Boisduval coll. (BMNH); 1 ♂, Pulo Penang (*Teylingen*) (UZM, Copenhagen); 1 ♂, Pulo Penang (*Lövendal*) (UZM, Copenhagen); 1 ♂, 2 ♀, Taiping, 1972, iii, viii.1973 (HI, Iruma City); 1 ♂, Pahang, Fraser's Hill, i.1955 (*Tayleur*) (BMNH); 1 ♀, Pahang, Fraser's Hill, 27.iv.1958 (*Tayleur*) (BMNH); 1 ♂, 3 ♀, Pahang, Genting Tea Estate, 600 m ('2000 ft'), 1.iv, 22.vi, 16.x.1976 (*Barlow*) (BMNH); 7 ♂, Perak, 550–1200 m ('1800–4000 ft'), xii.1896–vi.1897 (*Curtis*) (BMNH); 1 ♀, Selangore, R[B]ukit Putus, 900 m ('3000 ft'), v.1896 (*Curtis*) (BMNH); 3 ♀, Selangor, 100 m ('300 ft'), x.1954 (*Banks*) (BMNH); 1 ♂, Perak (*Banks*) (BMNH); 2 ♂, 12 ♀, Bukit Kutu [3°32′ N, 101°44′ E], 1000 m ('3300 ft'), ix.1927–vii.1928, and no date (*Sanderson*) (genitalia slide no.'s 14651, 15833; BMNH); 18 ♂, 15 ♀ (including allotype), Maxwell Hill, 9–21.ix.1929 (*Corbet*) (genitalia slide no. 8261; BMNH); 1 ♂, Perak, Maxwell Hill, 1350 m ('4500 ft'), i.1955 (*Morrell*) (BMNH); 2 ♀, Perak, Maxwell Hill, 1350 m, iii.1958 (*Maa*) (BPBM, Honolulu); 6 ♂, 2 ♀, [Mt] Gunong Ijan (BMNH).

Material excluded from paratype series. **Burma:** 1 ♂, Tenasserim Valley, ii–iii.1889 (*Doherty*) (BMNH). **Sumatra:** 1 ♀, south-western Sumatra [?], W. slopes Barisan Range, 750 m, ix–xii.1921 (*Pratt*) (TM, Pretoria); 4 ♂, 2 ♀, south-western Sumatra, North Korintji Valley, 1500 m, ix–x.1921 (*C. F. & J. Pratt*) (BMNH; TM, Pretoria); 1 ♀, Lebong Tandai, Mt Lalangir, 1050 m, vii.1923 (*Brooks*); 1 ♂, 1 ♀, Fort de Kock, 900 m, iv.1921, 1924 (*Jacobson*) (RNH, Leiden); 1 ♀, east coast, Darat Bangkat, 1909 (*De Bussy*) (BMNH). **Java:** 3 ♂, Res. [Dutch health resort] Soekaboemi [Sukabumi, 6°58′ S, 106°47′ E], 1895 (*Ledru*) (BMNH); 1 ♂, Malang (*Walsh*) (RNH, Leiden); 1 ♀, no data (BMNH). **Natuna Island:** 2 ♂, Bunguran, vii–x.1894 (*Hose*) (BMNH). **Borneo:** 6 ♂, 8 ♀, Kalimantan, Dent Province, Mt Marapok (BMNH); 1 ♂, 4 ♀, K., Samarinda, viii–x.1938 (*Walsh*) (BMNH); 1 ♂, no data (BMNH); 5 ♂, Sarawak, Kuching (BMNH; UM, Oxford); 4 ♂, S., Kuching (*Hewitt*) (RSM, Edinburgh); 1 ♀, S., Matang, 1100 m, vi.1898 (BMNH); 1 ♀, S., Gunong Matang, 100 m, ix.1958 (*Gressitt & Maa*) (BPBM, Honolulu); 1 ♀, S., Bidi, 1907–1908 (*Brooks*) (BMNH); 1 ♀, S., Bau District, Bidi, 90–250 m, ix.1958 (*Maa*) (BPBM, Honolulu); 2 ♂, S., Gunong Mulu Nat. Park, Mulu, 1790 m, lower montane (moss) forest, MV – canopy, i.1978 (*Holloway et al.*) (BMNH); 1 ♀, S., Gunong Mulu Nat. Park, Mulu, 1780 m, lower montane forest, MV – canopy/understorey, i.1978 (*Holloway et al.*) (BMNH); 3 ♀, S., Gunong Mulu Nat. Park, Mulu, 150 m, mixed dipt. for. MV – mainly canopy, ii.1978 (*Holloway et al.*) (BMNH); 2 ♂, 1 ♀, S., Gunong Mulu Nat. Park, Mulu, 1000 m, lower montane for., MV – canopy/understorey, ii.1978 (*Holloway et al.*) (BMNH); 1 ♀, S., Gunong Mulu Nat. Park, Long Pala (Base), 70 m, Alluv./second. for., MV – on batu–canopy, iii.1978 (*Holloway et al.*) (BMNH); 1 ♀, S., Gunong Mulu Nat. Park, W. Melinau Gorge, 130 m,

alluvial/Kerangas bank, Acl.–u' storey, iii.1978 (*Holloway et al.*) (BMNH); 1 ♂, Gunong Mulu Nat. Park, G. Api, 900 m, lower montane forest, MV and Act., iv.1978 (*Holloway et al.*) (BMNH). **Sulawesi:** 1 ♀, Koelawi Paloe, 950 m, iii.1937 (*Kalis*) (BMNH). No data: 2 ♀, Dutch East Indies, no exact data (BMNH); 1 ♀, 999 (TM, Pretoria).

The following data are dubious: **Sri Lanka:** 1 ♂, no exact data (BMNH). **Australia:** 1 ♂, 'Australie', ex Guenée coll. (BMNH).

Vitessa pyraliata triangulifera subsp. n.
(Figs 14, 113, 114, 165, 257, 303)

♂, ♀. 50–58 mm. Generally as described for species. Labial palpus in ♂ black; in ♀ first segment dorsally black, ventrally orange, second segment black, with strong lateral orange streak, third segment black. Patagium and tegula glossy blue-black, latter with anteromedial orange spot. Legs mostly black in ♂, in ♀ hind femur ventrally white, mid tibia bearing small dorsal white spot, mid and hind tibiae tipped with white. Fore wing above: orange subbasal area restricted from below costa to A_1, smaller in ♂. White antemedial fascia with anterior spot minute, mostly anterior to cell, posterior spot large, triangular, from behind cell to just past A_1. White postmedial fascia sometimes with faint white scales anterior and posterior to posterior spot in ♀. Hind wing above with broad, well demarcated, blue-black terminal band, acutely angled and narrowing at Cu_2; infuscation from base fairly heavy, restricting white medial area to about half of anal margin. Fore wing below: postmedial fascia, spots separate with slight diffusion.

Genitalia ♂ (Fig. 165). Generally as described for species. Clasper with two tooth-like processes, the more basal one the larger.

Genitalia ♀ (Figs 257, 303). As described for species.

Remarks. The external characters are much as in *V. pyraliata latialbata*, but the posterior white spot of the antemedial fascia on the upperside of the fore wing is smaller and triangular, not rectangular; the orange subbasal area is small in both sexes and lacks the subcostal streak to the base. In the hind wing this subspecies is distinct from *V. pyraliata latialbata* in having the white area more constricted by infuscation from base, especially in the ♂, but not so constricted as in the nominate subspecies. The ♀ is hardly distinguishable in external appearance from *V. philippina* of the *stettina*-group, which occurs sympatrically (the ♂ of *V. philippina* is unknown); *V. philippina* is smaller, with orange patagium and larger orange subbasal area, nearly reaching costa; its genitalia differ by the species-group characters (see Diagnosis, p. 286).

Biology. Early stages and host-plant unknown. Moths collected in February, May and August to November.

Distribution (Fig. 14). Philippines.

Material examined

Holotype ♂, **Philippines:** Luzon, Benguet, Baguio (*Baker*) (NMNH, Washington).

Paratypes. **Philippines:** 1 ♀ (allotype), data as holotype (NMNH, Washington); 1 ♀, Luzon, Tabato, ii.1916 (NMNH, Washington); 14 ♀, Luzon, Mt Makiling (*Baker*) (genitalia slide no. 342 DK) (NMNH, Washington; CNC, Ottawa); 1 ♂, Luzon [with conflicting labels], Mt Makiling, 350 m ('1070 ft'), 12.ix.1936 (*Salmon*) [and] Los Banos, 22.viii.1921 (*Pearson*) (NMNH, Washington); 7 ♀, Luzon, Manila, 19.viii–16.x.1912 (*Wileman*) (genitalia slide no.'s 14704, 14705, 15144, 15145, 15835; BMNH); 1 ♀, Luzon prov. Rizal, Manila, plains, v.1912 (*Wileman*) (genitalia slide no. 15834; BMNH); 4 ♀, Mindanao, Surigao, xi. (NMNH, Washington; CNC, Ottawa); 1 ♀, Mindanao, 15 km south-west of Davao, Mt Apo School, 500 m, x.1955 (*Davis*) (NMNH, Washington); 1 ♀, Mindanao, Lanao, Butig Mts, 24 km NE. of Butig, 1080 m, in rain forest, 21.vi.1958 (*Milliron*) (BPBM, Honolulu); 1 ♂, no data (Type no. 2636; genitalia slide no. Oxford 723–1977, Shaffer; UM, Oxford).

Vitessa pyraliata pyraliata Walker, 1864
(Figs 22, 41, 115, 116, 166, 197, 258, 304)

Vitessa pyraliata Walker, 1864, *List Specimens lepid. Insects Colln Br. Mus.* **31** Supplement: 220. LECTOTYPE ♀ [not ♂ as stated by Walker], Sulawesi ('Celebes') [(*Wallace*)] (genitalia slide no. 15828; BMNH), here designated [examined].

Vitessa pyraliata Walker; Ragonot, 1891 : 110.

Vitessa pyraliata Walker; Hampson, 1896*b* : 503.

Vitessa pyraliata Walker; Swinhoe, 1900 : 429.

♂, ♀. 46–58 mm. Generally as described for species. Labial palpus in ♂: second segment lightly admixed with orange; in ♀ second segment laterally orange to near tip. Patagium in ♂ glossy blue-black; in ♀ glossy blue-black, finely edged medially and laterally with orange. Tegula glossy blue-black with orange anteromedial spot. Legs in ♂: mid tibia with medial dorsal white spot; mid and hind tibiae tipped with white; in ♀, ventral surfaces of mid and hind femora white; medial white band and white tips on mid and hind tibiae. Fore wing above: orange subbasal area variable in size, from behind costa to *CuP*, smaller in ♂. White antemedial fascia with anterior spot minute, anterior to cell; posterior spot large, roughly triangular, from cell to just past A_1. White postmedial fascia with very large round spot over end of cell and discocellular vein, posterior spot on *CuP* minute. Hind wing above with broad, well-demarcated, blue-black terminal band in both sexes, with heavy infuscation from base; white medial area narrow in ♀, very narrow in ♂, almost to obliteration. Fore wing below: postmedial fascia forming large oval in ♂, two spots in ♀. Hind wing below: similar to upperside of ♀, sometimes restricted white area to centre of wing cut off from anal margin by infuscation.

GENITALIA ♂ (Figs 41, 166, 197). Generally as described for species. Clasper with two or three tooth-like processes, largest being second from base.

GENITALIA ♀ (Figs 258, 304). As described for species.

REMARKS. This subspecies is similar in size and external appearance to *V. pyraliata latialbata*, but is distinguished by the much-restricted white area of the hind wing in both sexes; it is distinguished from *V. pyraliata triangulifera* by the much-reduced posterior white spot of the postmedial fascia. It strongly resembles *V. kolakalis*, with which it flies over part of its range, but is distinguished by the smaller orange subbasal area and by the genitalia of both sexes, with clasper of valve in ♂ and without sclerotized depressed signa on corpus bursae in ♀. We have not traced the paralectotype from Seram collected by Wallace, mentioned by Walker in his description of *pyraliata*. It is probably not conspecific with the lectotype. All available Wallace specimens from the BMNH and UM, Oxford, collections have been examined. Swinhoe (1900 : 429) recorded two specimens from Makian, an island in the Moluccas south of Ternate, but these have not been traced.

BIOLOGY. Early stages and host-plant unknown. Moths collected in February, March, May, June and October.

DISTRIBUTION (Fig. 22). South-west and south-east Sulawesi; Flores.

MATERIAL EXAMINED

Sulawesi: 1 ♀, Makasar (*Wallace*) (UM, Oxford); 2 ♂, South Celebes (*Everett*) (BMNH); 1 ♂, 1 ♀, Bonthain, Indrulaman, 700 m, x.1895 (*Everett*) (BMNH); 4 ♀, near Maros, Tjamba, 450 m, ii.1938 (*Kalis*) (BMNH); 3 ♀, near Maros, Pangean, 600 m, iii.1938 (*Kalis*) (BMNH); 6 ♀, Goa, Malino, 1100 m, vi.1938 (*Kalis*) (BMNH); 1 ♀, Tombugu [Boengkoe 2°32′ S, 121°58′ E] (MNHN, Paris); 1 ♀, Ulu Kolaka, 500 m, v–vi.1939 (*Kalis*) (BMNH). **Flores:** 1 ♂, no exact data (*Everett*) (BMNH); 1 ♀, no exact data (*Wallace*) (UM, Oxford).

Vitessa kolakalis sp. n.

(Figs 22, 117, 118, 167, 198, 259, 305)

♂, ♀. 46–50 mm. Generally as described for *V. pyraliata*. Frons and vertex orange. Antenna black, in ♂ white on terminal region more extensive. Labial palpus: first two segments orange, third segment black, buff-tipped. Patagium orange with medial blue-black spot in ♂, anteromedial in ♀. Tegula blue-black, anteromedially orange at extreme base, inconspicuous in ♂, more obvious in ♀. Abdomen above: black, a few light scales on posterior margins of some segments; anal tuft orange. Abdomen below: black, segments with broad white posterior bands, narrowed or interrupted medially. Legs black, coxae with scattered white spots; hind femur ventrally white; mid tibia with dorsal white spot; tips of mid and hind tibiae and of spurs white. Fore wing above: orange subbasal area broad, narrowly short of costa, extending to A_1; white streak at base of posterior margin; white antemedial fascia broadly divided at cell, anterior spot short of costa, posterior spot larger, triangular, short of posterior margin; white postmedial fascia divided at Cu_2, large anterior spot round, posterior spot more distal, triangular, medially directed; apical white vein-lines weak in ♂, strong in ♀, short of termen and postmedial fascia; fringe dark grey. Hind wing above: medial white area narrowly restricted; broad blue-black terminal band, medial edge angled at base of cell;

infuscation from base stronger in ♂; fringe dark grey, distally white at apex. Fore wing below: postmedial fascia narrowly divided into two spots; apical vein-lines weak in ♀, absent in ♂; pale antemedial streak on anal fold; without shaggy scaling in ♂. Hind wing below as above.

GENITALIA ♂ (Figs 167, 198). Generally as described for *V. pyraliata*. Uncus slender, evenly tapering, basal portion wider, basally waisted, foramen wide, posteriorly rounded; lateral setae of moderate length. Gnathos with medial process wide, short, strongly angled, hook-shaped. Transtilla arcuate. Valve narrow, costa very broadly inflated, apex and termen broadly angled, posterior margin strongly excised ante- and postmedially; strong subcostal ridge to apex; mesal surface with fine oblique striations, more lateral near clasper; clasper a long diagonal ridge, continuous with straight carina, free edge rising gradually to near posterior margin, rising abruptly, forming single, slightly recurved, acuminate process, the falling distal edge joining posterior margin of valve at upper end of postmedial excision. Sclerotized dorsal surface of sclerite on anellus reticulated (Fig. 198); broadly rounded emargination at base of sclerotized manica, filled with very wide dorsal catena; catena slightly narrowing basally and longitudinally ridged, distally spined.

GENITALIA ♀ (Figs 259, 305). Generally as described for *V. pyraliata*. Posterior ostial sclerite (Fig. 305) with V-shaped medial flap on anterior margin, recurved, extending above posterior margin. Antrum very wide posteriorly, slightly asymmetrical, box-shaped. Corpus bursae globular, with single round, depressed, denticulate signum and single sclerotized, diffuse, denticulate patch.

REMARKS. In Sulawesi this species is easily confused with *V. pyraliata pyraliata*, but is distinguished by the largely orange patagium, the wider white area on the hind wing of the ♂; on the fore wing by the more distinct spots of both fasciae in the ♂ and the larger orange subbasal area in both sexes; in the ♂ by the absence of shaggy scaling on the undersides of the wings; the genitalia have larger spines on the cornuti clusters in the ♂ and different ostial sclerotization in the ♀. *V. kolakalis* is distinguished from *V. hollandi wallacealis* of the *stettina*-group, which occurs in Sulawesi, by the smaller white markings on the fore and hind wings; similarly it differs from all other members of the *pyraliata*-group by the reduced markings. The ♂ genitalia differ from those of other members of the *pyraliata*-group (so far as known) by the shape of the valve and clasper and the size of the dorsal catena; the ♀ genitalia differ in the asymmetrical development of the signa. The species is most closely related to *V. pyraliata* and *V. sulaensis*.

BIOLOGY. Early stages and host-plant unknown. Moths collected from May to June.

DISTRIBUTION (Fig. 22). South-eastern Sulawesi.

MATERIAL EXAMINED

Holotype ♂, **Sulawesi:** Ulu Kolaka, 500 m, v–vi.1939 (*Kalis*) (genitalia slide no. 8265; BMNH).

Paratypes. 10 ♂, 6 ♀ (including allotype), data as holotype (genitalia slide no.'s 14699, 14700, 15836, 15837, 15838, 15839; BMNH).

Vitessa sulaensis sp. n.

(Figs 22, 119, 260, 306)

♂. Unknown.

♀. 46 mm. Generally as described for *V. pyraliata* and *V. kolakalis*. Frons and vertex orange. Antenna black, base of scape orange, terminal third of dorsal scaling of shaft white, last few segments fuscous. Labial palpus: first two segments orange, third segment fuscous. Patagium orange with anteromedial blue-black spot. Tegula blue-black, anteromedially orange at extreme base. Abdomen above: black, posterior margins of segments narrowly white, anal tuft orange. Abdomen below: like upperside, wider segmental white margins. Legs black, hind femur ventrally white; mid tibia with dorsal white spot; tips of mid and hind tibiae white. Fore wing rather wide; above: ground-colour blue-black with dark-green hue; orange subbasal area almost circular, narrowly short of costa, extending to A_1; white scales at base of posterior margin; white antemedial fascia divided at cell into two spots, anterior spot small, short of costa, posterior spot larger, broad, triangular, short of posterior margin; postmedial fascia divided at Cu_2 into two spots, anterior spot round, very large, posterior spot more distal, triangular, medially directed, with minute spot anterior to distal end; five short but wide vein-lines in apical area, widely short of termen and postmedial fascia; fringe dark grey. Hind wing above: base and costa narrowly infuscated; terminal band blue-black, violaceous, broad, tapering to anal margin, inner border irregular; anal margin edged with black; white medial area broadly extended to anal margin; fringe [worn] dark grey. Fore wing

below: postmedial fascia as above, more diffuse, posterior spot less distal; isolated white scales at apex; retinaculum light grey. Hind wing below as above.

GENITALIA ♀ (Figs 260, 306). Generally as described for *V. pyraliata*. Posterior ostial sclerite (Fig. 306) with low, broad, quadrangular-based, V-shaped medial flap on anterior margin, narrowly recurved. Dorsal wall of antrum broadly extended posteriorly, distinctly trapezoidal and broadly connected to V-shaped flap on posterior sclerite; sclerotization narrowly extended anteriorly, with concave end formed within funnel-shaped expansion of ductus bursae. Corpus bursae globular, with an unequal pair of elongate, depressed denticulate signa.

REMARKS. This species is close to *V. pyraliata*, but differs externally in the more distal posterior white spot of the postmedial fascia of the fore wing; it differs from *V. kolakalis* by the more extensive white wing markings, and from remaining species in the group by the broader black terminal band of the hind wing. It is distinct from all other species of the group in genital characters.

BIOLOGY. Early stages and host-plant unknown. Holotype collected in October.

DISTRIBUTION (Fig. 22). Moluccas: Sanana ('Sula Besi').

MATERIAL EXAMINED
Holotype ♀, **Moluccas:** Sula Besi, x.1897 (*Doherty*) (genitalia slide no. 14628; BMNH).

Vitessa muluana sp. n.
(Figs 22, 120, 261, 307, 318)

♂. Unknown.

♀. 52 mm. Frons, vertex orange. Eye, ocellus black. Chaetosema with pale yellowish setae. Antenna black, ventral and inner surfaces of scape orange; dorsal scaling of apical third of shaft white. Labial palpus, first two segments orange, dorsal surfaces admixed with black, third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis basally black. Neck region orange. Thorax above: orange with medial 8-shaped blue-black spot; patagium orange with small anteromedial blue-black spot; tegula orange, anterolaterally and distally blue-black. Abdomen dark brown, anteriorly matt, posteriorly glossy. Body below: pectus orange; thorax black, flecked with orange; legs blue-black, fore and hind coxae mostly orange, mid and hind femora ventrally creamy white, mid and hind tibiae with medial and distal creamy white spots. Fore wing broad; ground-colour blue-black, violaceous; orange subbasal area large, narrowly short of costa, obliquely extended to near posterior margin, narrow subcostal streak extending to base, partially demarcating blue-black basal spot, medial margin jagged; yellowish white streak at base of posterior margin; creamy white antemedial fascia divided at cell, small triangular anterior spot subcostal, posterior spot broadly triangular, short of posterior margin, medially diffuse; creamy white postmedial fascia divided at Cu_2, anterior spot large, round, over discocellular vein, posterior spot a broad dash, more distal and medially diffuse; smaller streaks anteriorly and posteriorly at distal end; an additional minute spot between M_3 and Cu_1; terminal area with subapical white vein-lines extending to Cu_1; fringe dark grey. Hind wing above: infuscation from base and costa very narrow; terminal band blue-black, violaceous, broad at apex, acutely angled to past Cu_2, narrowing and finely terminating at anal margin; anal margin finely edged with black; white medial area very broad, extending over most of anal margin; fringe basally dark grey, distally light grey at apex, white to anal margin. Fore wing below: black, slightly violaceous; posterior margin basally white; white postmedial fascia with spots less clearly defined than above, finely separated at Cu_2, basally diffuse; retinaculum light grey. Hind wing below: as above with weak white vein-lines to Cu_2.

GENITALIA ♀ (Figs 261, 307, 318). High, wide, posteriorly prolonged ovipositor lobes, dorsally fused, surface densely setose, longer setae on margin, spiny setae conspicuous at ×25 magnification (Fig. 318). Apophyses fairly short, slightly curved, tips truncated, anterior pair thicker. Posterior ostial sclerite (Fig. 307) wide, posterior margin with medial sclerotization weak and partially emarginated; sclerite anteriorly tripartite, short lateral prolongations ending anteriorly in tooth-like points; medial section also tripartite, with short triangular, anteriorly directed lateral prolongations, medial area concave; ventrally, a shallow, slightly oblique, lateral pouch extending from mid way along prolongation of medial area to lateral margin of sclerite, free edge finely denticulate. Anterior sclerite with ventral margin very short, sclerotization strongest laterally, broadly wrinkled, inner surface finely denticulate, medially membranous; antrum mostly anterior to ventral margin, asymmetrical, very narrow, about half width of

posterior sclerite; posteriorly pyramidal, but last third quadrangular and fused to concave medial area of posterior sclerite; anteriorly with a weak transverse fracture-line in sclerotization, separating pyramidal area from asymmetrical, funnel-shaped and collar-like area, ventral surface of latter present on one side only, triangular. Ductus bursae narrowly expanded posteriorly, twisted to one side at junction with antrum, short duct anteriorly spinose; corpus bursae large and bearing a pair of sclerotized, depressed, irregularly shaped, denticulate signa.

REMARKS. We do not know the ♂ of this striking and distinctive species and its systematic position is as yet not fully ascertained; it may well need its own species-group. The white markings of the fore wing suggest relationship with the *pyraliata*-group, particularly with *V. nicobarica*, though they are closest in appearance to those of *V. teleroma* of the *V. suradeva*-group. The narrowness of the terminal band of the hind wing closely resembles those of the *V. plumosa*-group and *V. teleroma*. In the genitalia the antrum bears some resemblance to that of *V. gemina*, of the present group; the signa show affinity to this group as well; the spiny setae, which tend to be well developed in the *pyraliata*-group, are more conspicuous than in any other species of the genus.

BIOLOGY. Early stages and host-plant unknown. Moths collected in March and August to December.

DISTRIBUTION (Fig. 22). Borneo: Sarawak; Sabah.

MATERIAL EXAMINED

Holotype ♀, **Borneo:** Sarawak, Mt Mulu, 300–1200 m ('1000–4000 ft'), viii–xii.1894 (*Hose*) (genitalia slide no. 15846; BMNH).

Paratypes. **Borneo:** 1 ♀, Sabah, Park HQ, Mt Kinabalu State Park, 1550 m, 20.iii.1975, m/v light (*Munroe*) (genitalia slide no. 5196 DK; CNC, Ottawa).

Vitessa gemina sp. n.

(Figs 3, 121, 122, 262, 308)

♂. Unknown.

♀. 42–48 mm. Frons, vertex orange, latter admixed with black. Eye, ocellus brown. Chaetosema with pale yellowish setae. Antenna black, ventral and inner surfaces of scape orange, dorsal scaling of apical third of shaft heavily admixed with white. Labial palpus: first two segments orange, third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis black, heavily admixed with orange. Neck region orange. Thorax above: blue-black, anteriorly and posteriorly orange; patagium orange, with large, posteromedial, glossy blue-black spot; tegula orange, with very large anterolateral and terminal glossy blue-black spots. Abdomen above: blackish fuscous, anal tuft orange. Body below: pectus orange; thorax blue-black, large yellow spot below tegula; abdomen with posterior margins of segments narrowly creamy white, anal tuft orange. Legs black, partly with dark green hue; fore coxa dorsally flecked with orange, ventrally white; mid and hind coxae with whitish grey bands; mid and hind femora ventrally white; mid tibia with dorsal medial white spot; mid and hind tibiae tipped with white. Fore wing of moderate width; above: ground colour glossy blue-black; orange subbasal area large, narrowly short of costa, obliquely extended to near posterior margin, narrow subcostal streak, sometimes incomplete, extending to base, partially demarcating large blue-black basal spot, medial margin broadly indented at cell and A_1; white antemedial fascia divided at cell, small anterior triangular subcostal spot, large posterior triangular spot short of posterior margin, both medially directed; white postmedial fascia divided at Cu_2, anterior, large, round spot over discocellular vein, posterior, small, diffusely triangular, more distal spot; terminal area with white vein-lines on most veins, indistinct after Cu_1, reaching termen, but narrowly short of postmedial fascia; fringe dark grey. Hind wing above, small amount of infuscation from base and narrowly from costa, terminal band blue-black, violaceous, broad at apex, acutely angled to past Cu_2, very narrow at termen, abruptly terminating at anal margin; anal margin finely edged with black; white medial area wide, broadly extended to anal margin; fringe basally dark grey, distally light grey. Fore wing below: black, slightly violaceous; posterior margin basally white; white postmedial fascia with spots less clearly defined than above, finely separated at Cu_2, basally diffuse; weak white apical vein-lines to M_3; retinaculum dark grey. Hind wing below as above, weak vein-lines to Cu_1.

GENITALIA ♀ (Figs 262, 308). High, broad, posteriorly prolonged ovipositor lobes, dorsally fused, surface densely setose, longer on margin; spiny setae fairly conspicuous at ×25 magnification. Posterior apophysis short, slender, slightly curved, tip spatulate. Anterior apophysis long, thick, curved, tip spatulate. Posterior

ostial sclerite (Fig. 308) broad, long, with wide lateral prolongations, each with two broad transverse constrictions; posterior margin with shallow medial emargination; anterior margin with medial area sharply differentiated into a laterally constricted quadrangle, demarcated posteriorly by a convex fold. Anterior sclerite broad, with ventral margin recurved, heavily wrinkled; posterior dorsal wall of antrum medially prolonged, narrowly dome-shaped, connected to medial quadrangular area of posterior sclerite; dorsal and ventral wall of antrum narrowly extended anteriorly, slightly asymmetrical, broadly concave and funnel-shaped at junction with expanded end of ductus bursae; ductus bursae slightly convoluted posteriorly, spinose anteriorly; corpus bursae oval, bearing minute paired denticulate areas.

REMARKS. This species closely resembles *V. hollandi hollandi* of the *stettina*-group in external appearance, and can be distinguished reliably only by examination of the genitalia. The ♀ genitalia are distinct from those of the rest of the *pyraliata*-group.

BIOLOGY. Early stages and host-plant unknown. Moths collected between May and June and between August and September.

DISTRIBUTION (Fig. 3). New Guinea: Irian Jaya (Kepulauan Schouten).

MATERIAL EXAMINED

Holotype ♀, **New Guinea:** Irian Jaya (Kepulauan Schouten), Mefor ('Numfoor'), Suer, v–vi.1897 (*Doherty*) (genitalia slide no. 14638; BMNH).

Paratypes. **New Guinea:** 3 ♀, Irian Jaya (Kepulauan Schouten), data as holotype (genitalia slide no.'s 14684, 15139, 15840; BMNH); 1 ♀, I. J., Mefor Island, Geelvink Bay, 15.viii–10.ix.1920 (*C., F., & J Pratt*) (TM, Pretoria); 3 ♀, I. J., Biak, 1896 (*Doherty*) (genitalia slide no. 14683; BMNH).

Vitessa splendida Schultze, 1908
(Figs 14, 123, 263, 309)

Vitessa splendida Schultze, 1908, *Philipp. J. Sci.* **3** (1) A : 35, pl. 1, fig. 11. Holotype ♀, PHILIPPINES: Negros Occidental, Maao, xi.1902 (*Banks*) (originally in Entomological Collection, Bureau of Science, Manilla; now destroyed).

♂. Unknown.

♀. 44–46 mm. Frons, vertex orange. Eye, ocellus black. Chaetosema with pale yellowish setae. Antenna black, ventral surface of scape orange, dorsal scaling of apical third of shaft [presumably] white [antennae damaged]. Labial palpus: first two segments orange, third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis blue-black. Neck region orange. Thorax above: orange, large blue-black medial spot, posteriorly tipped with yellowish white; patagium glossy blue-black, laterally tipped and medially edged with orange; tegula orange with longitudinal, broad, glossy blue-black stripe along entire length. Abdomen above, matt fuscous; posterior margins of segments narrowly white, anal tuft orange. Body below: pectus orange; thorax black, banded with white; abdomen with posterior margins white, broader than above, anal tuft orange. Legs blue-black, partly with dark green hue; fore coxa dorsally flecked with orange, ventrally white; mid and hind coxae spotted with white; mid and hind femora ventrally white; mid and hind tibiae with medial bands and tips white, outer surfaces of spurs white; hind tarsus with dorsal white spot at end of first segment. Fore wing of moderate width; above: ground-colour glossy, green-black; orange subbasal area large, narrowly short of costa, short of posterior margin but passing A_1, medial margin sinuate, narrow streaks at subcostal and A_1 regions extended to base, the subcostal streak broader, the anal streak weak and sometimes parted at centre, the streaks demarcating a blue-black oval basal spot; creamy white antemedial fascia divided by a wedge at cell, anterior spot subcostal, narrowly triangular, medially directed, posterior spot larger, basal margin level with anterior spot, slightly short of posterior margin, broadly triangular, medially diffuse; creamy white postmedial fascia divided at Cu_2, large round anterior spot over discocellular vein, posterior spot smaller, narrowly triangular, more distal, medially directed, minute white scaling anterior and posterior to terminal edge; terminal area with strong creamy white vein-lines, extending from termen but short of postmedial fascia; fringe dark grey. Hind wing above: slight basal and narrow costal infuscation; violaceous blue-black terminal band, broad at apex, evenly tapering to anal margin, white medial area large, broadly extended to white anal margin; fringe basally dark grey, distally white at apex. Fore wing below: black, slightly violaceous; weak subcostal white streak from base; posterior margin shiny yellowish fuscous, broadly white at base; well-developed white postmedial spots; weak white apical vein-lines; fringe dark grey; retinaculum light grey. Hind wing below as above, weak white apical vein-lines; fascia white, dark grey at base of termen.

GENITALIA ♀ (Figs 263, 309). High, wide, posteriorly prolonged ovipositor lobes, dorsally fused, surface densely setose, larger setae on margin, spiny setae visible but not conspicuous at ×25 magnification. Apophyses short, slightly curved, tips bluntly spatulate, anterior pair thicker. Posterior ostial sclerite (Fig. 309) very broad, densely sclerotized, with long, wide, anteriorly directed, lateral prolongations; posterior margin heavily sclerotized, medially swollen and slightly recurved, curved transverse pleats converging on swollen margin; anterior margin medially with short lateral prolongations joining antrum. Anterior sclerite very broad, ventral margin long, recurved, medially wrinkled, laterally minutely spinose on membranous area; posterior dorsal wall of antrum with posterior edge recurved, converging broadly and joining medial margin of posterior sclerite; very long anterior extension of antrum symmetrical, heavily sclerotized, dorsal wall broadly bowl-shaped, ventral wall with deep triangular folds on either side of opening of ductus bursae; posterior end of ductus bursae slightly swollen and pleated, remainder minutely spinose, merging gradually with oval corpus bursae; the latter bearing a single denticulate area.

REMARKS. The wing markings resemble those of *V. plumosa* and *V. suradeva* but differ in having less extensive white fasciae, and in the fasciae not being joined by medial streaking; the white terminal vein-lines are close to, but do not join the postmedial fascia; the shorter orange subbasal area does not reach the posterior margin. Superficially the species resembles other Philippine species: *V. philippina* of the *stettina*-group and *V. pyraliata triangulifera* of the *pyraliata*-group, but it differs by the larger orange subbasal area and larger white medial area of the hind wing. This species is very distinct on genital characters. The holotype of *V. splendida* was destroyed during the Second World War, but it was well figured by Schultze and the NMNH specimens have at one time been compared with the holotype. As material from Negros Island is not available, we do not designate a neotype.

BIOLOGY. Early stages and host-plant unknown. Moths collected in May, August, September and November.

DISTRIBUTION (Fig. 14). Philippines: Manila to Mindanao and Palawan.

MATERIAL EXAMINED

Philippines: 1 ♀, Luzon, Manila, ix.1912 (*Wileman*) (BMNH); 3 ♀, Luzon, Mt Makiling (*Baker*) (NMNH, Washington; CNC, Ottawa); 1 ♀, Mindanao, Surigao, xi (BMNH); 1 ♀, Mindanao, Subprov. Lanao, Kolambugan, sea level, v.1914 (*Wileman*) (BMNH); 1 ♀, Palawan, Brookes Point, Uring Uring, viii.1961 (ZM, Copenhagen).

The *plumosa*-group

DIAGNOSIS. Wing markings basically as in the *stettina*- and *suradeva*-groups, but white antemedial fascia with two long acuminate streaks on *R* and *Cu*, bordering a V-shaped indentation, extending to postmedial fascia; white postmedial fascia divided into an oval anterior spot and two distinct, narrowly triangular, basal spots, anterior and posterior to A_{1+2}. ♂ genitalia with distal portion of uncus down-curved then up-turned, narrowed, with laterally directed setae, as in the *pyraliata*-group and several others; valve with slight distal expansion; clasper with prominent, bifid, anteromedially directed process, not paralleled in other groups; base of long oblique clasper showing affinities with the *hemiallactis*- and *pyraliata*-groups. Ostial chamber of ♀ genitalia with long ventral margin of anterior sclerite more strongly developed than in any other species-group.

Vitessa plumosa Hampson, 1896
(Figs 22, 31, 39, 124–127, 168, 169, 199, 200, 216, 264, 265, 310, 311)

Vitessa plumosa Hampson, 1896*b* : 503.

♂, ♀. 38–52 mm. Frons, vertex orange. Eye, ocellus brown. Chaetosema with pale yellowish setae. Antenna black, anterior surface of scape basally orange; dorsal scaling of apical third of shaft black, sometimes with isolated white scales, exceptionally with an extensive white zone; terminal segments fuscous. Labial palpus: first two segments orange, sometimes admixed with black, third segment black. Maxillary palpus basally black, distally orange. Basal scaling of proboscis blue-black. Neck region orange. Thorax above: orange, 8-shaped blue-black medial area, posteriorly tipped with pale yellow; patagium orange with variable-sized, posteromedial, glossy blue-black spot; tegula orange with variable-sized, longitudinal, glossy blue-black medial band. Abdomen above: black, posterior margins of segments broadly white,

posterior segment blue-black, laterally orange, anal tuft orange. Body below: black with greenish hue; pectus orange; white abdominal margins broader than above; posterior half of terminal segment and anal tuft orange. Legs black with greenish hue; fore coxa dorsally orange, ventrally white; mid and hind coxae banded with white; fore femur ventrally edged with orange; mid and hind femora ventrally white; mid and hind tibiae medially banded and tipped with white; tibial spurs white; hind tarsus with dorsal posterior tip bearing white dot. Fore wing rather narrow; above: ground-colour glossy blue-black with dark green hue; orange subbasal area large, narrowly short of costa and posterior margin, medial margin sinuate, sometimes with subcostal medial extension, subcostal streak extending to base, basal margin protruding at *CuP*, basal blue-black spot partly demarcated; white antemedial fascia with basal margin incurved, especially towards costa, narrow black medial wedge at cell sometimes dividing fascia, anterior spot a narrow triangular streak, medially directed and acuminate, sometimes touching postmedial fascia, posterior area with medially directed and acuminate triangular extension touching postmedial fascia, base narrowing to near posterior margin; white postmedial fascia distinctly divided into four markings, divisions at *Sc*, Cu_2 and A_1, a long thin subcostal line, a large oval discocellular spot with slight terminal indentation, posterior to this a narrowly triangular, medially directed spot, nearly touching antemedial fascia, shorter in ♂, the most posterior streak slightly thinner, short of posterior margin, terminal margin of fascia slightly oblique or at right angles to posterior margin; terminal area with thick white vein-lines extending from termen to postmedial fascia; fringe dark grey. Hind wing above: narrow infuscation from costa, violaceous blue-black terminal band, broad at apex, gradually tapering or strongly angled at Cu_2 and narrow to anal margin; large white medial area, broadly extending to white anal margin; fringe basally grey, distally white. Fore wing below: ground-colour blue-black, violaceous; orange-brown area around white retinaculum; posterior margin broadly white from base; short white subcostal streak from base, lightly admixed with yellow; white postmedial fascia with large discocellular spot indented terminally, a smaller, less distinct, more distal spot posterior to Cu_2; white vein-lines apically, minutely at termen to Cu_2; fringe grey. Hind wing below as above, white along costa apically, apical vein-lines continued minutely on termen to Cu_1; fringe white.

GENITALIA ♂ (Figs 31, 39, 168, 169, 199, 200, 216). Uncus long, slender, narrowly constricted at tegumen, with pronounced lateral flanges; base slightly constricted, gradually tapering, bearing long narrow foramen; distal portion rod-like with sparse, short lateral setae, de-curved then up-turned to acuminate tip. Gnathos with wide lateral arms, converging to a long, compressed, acuminate, scythe-shaped medial process, not as long as uncus. Transtilla arcuate, medially broadened, posterior margin sometimes medially excised, lateral flexure pronounced. Tegumen with posterior sclerite broad, rounded; anterior sclerite with very broad medial emargination. Vinculum broad, basally concave. Valve narrow, base narrowly inflated, costa sinuate, apex pronounced, narrowly rounded, termen broadly rounded, posterior margin sinuate towards base; mesal surface with finely converging oblique striations; clasper with oblique base separated from crease-like carina, base abruptly upturned, forming prominent, bifid, anteromedially directed process, distal side curving gradually, forming raised serrate ridge terminating close to posterior margin shortly before terminal angle. Juxta with large, narrow lateral sclerites (Fig. 31), very long, flat, narrow, upturned, ventral process; dorsal process broader, shorter, bearing setae, directly connected to ridged sclerite on anellus (Figs 199, 200); large narrow catena (Fig. 39) between sclerites, heavily sclerotized, constricted anteriorly, deeply ridged, tips laterally diverging, multiple spines posteriorly; manica supported by sclerotized bands. Aedeagus long, distally expanded, base narrowly rounded; ductus ejaculatorius subbasal; vesica with spines spreading ventrally to distal end of aedeagus, here membrane bulbous and transversely rugose; vesica sharply tapering distally; dorsally spinose, longitudinally rugose, lightly sclerotized; sclerotized junction with aedeagus forming a sharp elbow-joint when vesica everted and reflexed; three cornuti clusters (Fig. 216); two dorsolateral; the left with long, short-spined sclerotized bar, large spines posteriorly, the right lacking bar, smaller patch of spines posteriorly; one ventrolateral cluster with large spines.

GENITALIA ♀ (Figs 264, 265, 310, 311). High, wide, posteriorly prolonged ovipositor lobes, dorsally fused; surface densely setose, longer setae on margin, spiny setae visible but not conspicuous at ×25 magnification. Apophyses slightly curved, tips truncate; anterior pair longer, thicker. Posterior ostial sclerite (Figs 310, 311) broad with long lateral prolongations; posterior margin medially emarginate, thickened, slightly recurved; sclerite with lateral transverse ridge and oblique, shallow, pouch-like invagination; lateral prolongation constricted, with ventromedial edge deeply recurved; anterior margin medially elongated, bearing small recurved flap. Anterior sclerite with very long ventral margin, half as wide as sclerite, recurved, wrinkled, minutely spinose laterally; antrum posteriorly broad and rounded, margin joined to recurved edge of lateral prolongation and medial flap of posterior sclerite; anterior development long, forming large funnel-shaped structure, ventral wall producing sclerotized base of ductus seminalis, dorsal

wall with deep V-shaped in-fold; antrum merging with swollen end of ductus bursae; ductus bursae long, slender, medially spinose; corpus bursae globular, bearing a pair of minute denticulate areas.

Remarks. This species most closely resembles *V. suradeva*, but the long triangular medial streaks of the antemedial fascia on the fore wing are very distinctive. An unusual feature of *V. plumosa* is the frequent great restriction of white dorsal scaling on the antenna. Very few specimens examined had the normal antennal pattern. The genitalia are distinctive in both sexes. There is some variation in this species, at least partially geographically correlated. Specimens from Sumbawa and Lombok are larger than others and have the subbasal area of the fore wing relatively restricted; those from Bali in the west and from the eastern part of the Lesser Sunda chain are smaller and have the orange area larger. More material will be needed to determine whether these apparent geographical correlations are consistent. A long series from Salajar appears consistently different from specimens from the Lesser Sunda Islands. For the present we recognize two subspecies, from the following geographical areas: (1) Bali; Lombok; Sumbawa; Kalao; Timor and Damar; (2) Salajar.

Biology. Early stages and host-plants unknown. Moths collected in January, April and from September to December.

Distribution (Fig. 22). Lesser Sunda Islands and Salajar.

Vitessa plumosa plumosa Hampson, 1896
(Figs 22, 31, 39, 124, 125, 168, 199, 216, 264, 310)

Vitessa plumosa Hampson, 1896*b*, *Trans. ent. Soc. Lond.* **1896** : 503. Holotype ♂, Sumbawa: ix.1891 (*Doherty*) (genitalia slide no. 8256; BMNH) [examined].
Vitessa plumosa Hampson; Pagenstecher, 1898 : 200.

♂, ♀. 41–52 mm. Generally as described for species. Antenna completely black. Fore wing above: orange subbasal area variable in width; white antemedial fascia sometimes divided at cell. Hind wing above: black terminal band broad at apex, abruptly narrowing at Cu_2, narrow to anal margin.

Genitalia ♂ (Figs 31, 39, 168, 199, 216). As described for species.

Genitalia ♀ (Figs 264, 310). As described for species.

Remarks. Topotypical specimens from Sumbawa and specimens from Lombok are larger than the material from other islands, including the subspecies *salayerensis*, with proportionally larger genitalia and broader fore wings. Material from Bali and the islands east of Sumbawa do not conform exactly with the Lombok–Sumbawa series; these specimens have slightly wider orange subbasal areas, similar to those in the Salajar series, and the hind wing markings are somewhat intermediate between the two subspecies. However, the material grouped under the nominate subspecies differs consistently from the Salajar subspecies by the shape of the terminal band on the hind wing, the narrowness of which, after passing Cu_2, is similar to that in *V. teleroma* of the *suradeva*-group. It is likely that more material will show that additional subspecies should be recognized in the lesser Sunda Islands.

Biology. Early stages and host-plant unknown. Moths collected in January, April, and from September to December.

Distribution (Fig. 22). Lesser Sunda Islands from Bali to Damar.

Material examined
Bali: 1 ♂, West Bali, Mondoktoempang, 750 m, x.1934 (*Kalis*) (BMNH). **Lombok:** 4 ♂, 1 ♀, Sapit, 600 m, iv–vi.1896 (*Fruhstorfer*) (BMNH; RNH, Leiden). **Sumbawa:** 1 ♂, ix.1891 (*Doherty*) (BMNH). **Kalao:** 1 ♀ [paralectotype of *Vitessa teleroma* Swinhoe] (BMNH). **Timor:** 1 ♂, Oinainisa ('Oinanissa') [64·3 km from Kupang, 600 m], xi–xii.1891 (*Doherty*) (BMNH); 1 ♀, Suai, i.1918 (*Wahr*) (BMNH). **Damar:** 1 ♀, Dammer, xii.1898 (*Kühn*) (BMNH).

Vitessa plumosa salayerensis subsp. n.
(Figs 22, 126, 127, 169, 200, 265, 311)

♂, ♀. 38–44 mm. Generally as described for species. Antenna black, posterior surface of apical third of shaft either with isolated white scales or with extensive white scaling. Fore wing above: orange subbasal area slightly variable but moderately wide; white antemedial fascia with large medial indentation, but never divided completely. Hind wing above: black terminal band broad at apex, gradually tapering to anal margin.

GENITALIA ♂ (Figs 169, 200). As described for species.

GENITALIA ♀ (Figs 265, 311). As described for species.

REMARKS. Specimens of this subspecies are consistently smaller than topotypical specimens of the nominate subspecies, but about the same size as specimens from Bali, Kalao, Timor and Damar. The fore wing is narrower, the orange subbasal area is generally wider. The hind wing has the black terminal band more evenly curved, wider in the cubital area than in the nominate subspecies, and with the medial margin either fairly straight or evenly curved. In the ♂ genitalia the valve is slightly narrower, especially at the terminal margin.

BIOLOGY. Early stages and host-plant unknown. Moths collected in December.

DISTRIBUTION (Fig. 22). Salajar.

MATERIAL EXAMINED

Holotype ♂, **Salajar** ('Seleyer'): Somarisi, 500 m ('1660 ft'), xii.1938 (*Kalis*) (BMNH).

Paratypes. 54 ♂, 73 ♀ (including allotype), data as holotype (genitalia slide no.'s 14652, 14653, 15843, 15844; BMNH).

The *suradeva*-group

DIAGNOSIS. Wing pattern variable, but basically as in the *stettina*-group; antemedial fascia not with long, acuminate, distal streaks on *R* and *Cu* as in the *plumosa*-group. Hind wing with white basal and distal area and contrasting blackish fuscous terminal band. ♂ genitalia with basal portion of uncus very wide, distal portion rod-shaped, down-curved then up-turned, with long lateral setae; valve with distinctive subquadrate outline, costa strongly bent subbasally, valve consequently opening in dorsal-ventral preparation at right angles, not at an acute angle, to tegumen and uncus; termen of valve nearly truncate; clasper a low flange, with small angular, ventrally directed, scoop-like process. The ♀ genitalia with posterior sclerite of ostial chamber reduced and lightly sclerotized; anterior sclerite with antrum heavily sclerotized, very large and pouch- or sack-shaped, more extensive than in other species-groups.

Vitessa teleroma Swinhoe, 1906
(Figs 23, 128–130, 170, 201, 217, 266, 312)

Vitessa teleroma Swinhoe, 1906, *Ann. Mag. nat. Hist.* (7) **18** : 412. LECTOTYPE ♂, MALAYA: Perak, 1907-128 (genitalia slide no. 8255; BMNH), here designated [examined].

♂, ♀. 42–50 mm. Frons, vertex orange. Eye brown. Ocellus minute or absent. Chaetosema with pale yellowish setae. Antenna black, anterior surface of scape basally orange; dorsal scaling of apical third of shaft white, last several segments fuscous. Labial palpus: first two segments orange, third segment black, inner surface and tip with light admixture of orange in ♀. Maxillary palpus basally black, distally orange. Basal scaling of proboscis glossy blue-black. Neck region orange. Thorax above: orange, 8-shaped medial blue-black area, posterior margin white; patagium orange with posteromedial glossy blue-black spot; tegula with anterolateral glossy and terminal blue-black spot. Abdomen above: first segment white, remaining segments black, posterior margins white, progressively narrowing to anal end, terminal segment with posterior margin and anal tuft orange. Body below: black; pectus orange; abdomen as above from second segment on. Legs black; fore coxa dorsally black admixed with orange, ventrally edged with white; fore femur posteroventrally tipped with white; mid and hind femora ventrally white; mid and hind tibiae with broad medial white band; tibiae posteriorly tipped with white; tibial spurs white, admixed with black in ♀. Fore wing above: ground-colour blue-black with dark green hue. Orange area basal, subcostal, sometimes extending to posterior margin, base of posterior margin white; orange subcostal streak to base, narrower streak to base on *CuP*, sometimes broken, demarcating large round blue-black spot from *Sc* to *CuP*, narrower oblique blue-black spot in cubital area; fairly wide blue-black subcostal fascia; white

antemedial fascia just short of costa and posterior margin, divided at cell, small anterior spot narrow and triangular, posterior spot larger, rectangular; white postmedial fascia short of costa and posterior margin, divided at Cu_2 in ♂, anterior spot large, oval, over discocellular vein, traces of subcostal streak towards apex, posterior spot smaller, more distal, triangular, directed along *CuP*; in ♀ subcostal streak stronger, smaller white streaks anterior and posterior to posterior spot; terminal area with all veins white, thicker in ♀, extending from termen, short of posterior spots of postmedial fascia; fringe dark grey. Hind wing above: narrow infuscation from costa, blue-black, violaceous terminal band, broad at apex, gradually tapering to anal margin in ♂, narrower in ♀ and abruptly angled at Cu_2, finely tapering to anal margin; large white medial area broadly extending to and including most of anal margin. Fore wing below: black, violaceous; white subcostal streak at base; broad white streak at posterior margin; white postmedial fascia as above, weaker, more diffuse; short, weak, white apical vein-lines, more extensive in ♀; retinaculum white; fringe as above. Hind wing below: as above; costa edged with white; short, weak apical vein-lines, more extensive in ♀; fringe white.

Genitalia ♂ (Figs 170, 201, 217). Uncus long, de-curved then up-turned; basal portion very wide, flattened, laterally constricted, with long narrow foramen; distal portion rod-like with short sparse lateral setae. Gnathos with wide lateral arms, converging to a long, compressed, acuminate, claw-shaped medial process, not as long as uncus. Transtilla V-shaped, medially broadened, high, pronounced lateral flexure. Tegumen: posterior sclerite broad with posterior margin straight; anterior sclerite with narrow medial emargination. Vinculum broad, basally concave. Valve long, costa basally strongly arched, then straight and parallel to posterior margin, narrowly inflated for most of length, up-turned to apex; apex subtruncate; termen broadly rounded; posterior margin sinuate; mesal surface with fine longitudinal and oblique striations; clasper with small, oblique, raised basal ridge, separated from crease-like carina, not meeting free edge of distal part of clasper, a free edge rising abruptly, recurving to form round raised scoop-like process, becoming tubular and distally tapering, running parallel to posterior margin, terminating at two-thirds length. Juxta with large, narrow lateral sclerites; ventral process very long, flat, narrow, up-turned; dorsal process broader, shorter, up-turned near centre and bearing setae, directly connected to long curved sclerite on anellus, longitudinally ridged and bearing spines; between spiny sclerites a large, narrow, oval, sclerotized catena, longitudinally creased, medially and distally spined (Fig. 201); manica supported by sclerotized bands. Aedeagus long, distally expanded, base narrowly rounded; ductus ejaculatorius subbasal; vesica with spines spreading ventrally to distal end of aedeagus, here membrane bulbous and transversely rugose; vesica of even width, abruptly narrowing after cornuti clusters; vesica dorsally spinose and longitudinally rugose; junction with sclerotized aedeagus forming elbow-joint when vesica everted and reflexed; two ventrolateral cornuti clusters (Fig. 217), variable in length, each with long spines, left cluster two to four times as long as right, with about 40–80 spines, right cluster with about 20–30 spines.

Genitalia ♀ (Figs 266, 312). High, narrow, posteriorly prolonged ovipositor lobes, dorsally fusing, surface densely setose, longer setae on margin, spiny setae visible but not conspicuous at ×25 magnification. Eighth tergite with anteromedial margin long, broadly rounded. Posterior apophysis short, thin, nearly straight; anterior apophysis longer, broader, curved, tip spatulate. Posterior ostial sclerite (Fig. 312) weakly sclerotized, weakly constricted laterally and ventrally; posterior margin shallowly V-shaped; short lateral prolongations; short medial development on anterior margin. Anterior sclerite with weakly sclerotized ventral margin, narrow, finely wrinkled, laterally setose. Antrum very large, heavily sclerotized, pouch-shaped, slightly waisted posteriorly; dorsal part posteriorly broadly rounded, with margin ventrally recurved at junction with anterior margin of posterior sclerite; anteriorly with strong dorsal reflexion; ventral part with irregular transverse and oblique creases, especially on raised margins of aperture of ductus seminalis about mid-way, these creases and those at junction with sclerotized raised base of ductus bursae making antrum asymmetrical. Ductus bursae minutely spinose along entire length. Corpus bursae globular, with very minute paired denticulate areas.

Remarks. This species is closely related to *V. suradeva*. It differs externally by the restricted pale markings and the complete black subbasal fascia of the fore wing, and by the appreciable posterior tapering of the terminal band of the hind wing. The ♂ genitalia are very similar to those of *V. suradeva*, but differ in the larger cornuti clusters and the narrower longitudinal element of the clasper. The ♀ genitalia differ in the generally larger, broader antrum and in the reflexion of its anterior margin. This species bears a superficial resemblance to some members of the *stettina*- and *pyraliata*-groups; the ♀, with extra white markings of the fore wing postmedial fascia, closely resembles *V. muluana*. However, *V. teleroma* is distinguishable from all these by the genital

characters of the species groups (see diagnoses of *stettina*-group, p. 286, *pyraliata*-group, p. 303, *suradeva*-group, p. 317).

BIOLOGY. Early stages and host-plant unknown. Moths collected in March, May, June, September and October.

DISTRIBUTION (Fig. 23). Malaya; Sumatra; Natuna Island; Borneo. Dubious records from Sri Lanka, India: Darjiling.

MATERIAL EXAMINED

Paralectotypes. **Malaya:** 1 ♂, Perak, 6844 (genitalia slide no. 15845; BMNH). **Borneo**: 1 ♂, 2 ♀, no data, Moore coll. (genitalia slide no.'s 8263, 15850; BMNH). [1 ♀, Kalao Is., see under *Vitessa plumosa plumosa* Hampson.]

Malaya: 1 ♂, Pulo Pinang ('Penang Island'), ex Boisduval coll. (BMNH); 1 ♂, 1 ♀, Penang, 1896 (*Curtis*) (BMNH); 5 ♂, Penang (BMNH; CMAG, Birmingham, UM, Oxford; MM, Manchester); 3 ♂, Penang, Government Hill, 300 m, v.1898 (*Curtis*) (BMNH); 1 ♂, Penang Hill, ix.1932 (*Corbet*) (BMNH); 3 ♂, Fraser Hill, x.1930 (*Corbet*) (BMNH); 5 ♂, Bukit Kutu, 1000 m (*Sanderson*) (BMNH); 1 ♂, Kutu Hill, 1050 m, iii.1931 (*Corbet*) (BMNH); 4 ♂, Wellesley Province (*Distant*) (TM, Pretoria). **Sumatra:** 2 ♂, SW. Sumatra, N. Korintji Valley, 1500 m, ix–x.1921 (*Pratt*) (TM, Pretoria); 1 ♂, no exact data, Adams Bequest (BMNH). **Natuna Island:** 1 ♂, Bunguran, vii–x.1894 (*Hose*) (BMNH). **Borneo:** 1 ♀, Kalimantan, Island of Pontianak, Sintang, xii.1909 (*Martin*) (BMNH); 1 ♀, K., Samarinda, ix.1938 (*Walsh*) (BMNH); 2 ♀, no exact data (BMNH; CAS, San Francisco); 1 ♂, Sarawak, Matang, 1100 m, vi.1900 (*Shelford*) (BMNH); 4 ♂, S., Gunong Mulu Nat. Park, Mulu, 1790 m, lower montane (moss) forest, MV – canopy. i.1978 (*Holloway et al.*) (BMNH); 1 ♂, S., Gunong Mulu Nat. Park, G. Api, 1500 m, scrub, pandanus, Act. iv.1978 (*Holloway et al.*) (BMNH). No data: 1 ♂, 1 ♀, ex Felder coll. (BMNH); 1 ♂, ex Joicey coll. (BMNH); 1 ♂ (UZM, Copenhagen). Dubious data: 1 ♀, Ceylon (*Niet.*) ex Felder coll. (BMNH); 1 ♀, Darjeeling (BMNH).

Vitessa suradeva Moore, [1860]
(Figs 24, 32, 40, 131–134, 171, 172, 202, 203, 218, 267, 268, 313, 314)

Vitessa suradeva Moore, [1860] : 299.

♂, ♀. 30–54 mm. Frons, vertex orange. Eye, ocellus brown. Chaetosema with pale yellowish setae. Antenna black, anterior surface of scape basally orange; dorsal scaling of apical third of shaft white, extending to nearly half length of shaft in ♀, last several segments fuscous. Labial palpus: first two segments orange, third segment black, sometimes minutely tipped with white. Maxillary palpus basally black, distally orange. Basal scaling of proboscis blue-black, ventrally admixed with orange. Neck region orange. Thorax above: large medial black oval spot, anteriorly and laterally orange, posteriorly white; patagium orange with posteromedial glossy blue-black spot; tegula orange, anterolateral glossy blue-black spot, tip black. Abdomen above: black, posterior margins of segments white, widest on second segment, progressively narrowing, terminal segment with posterior margin and anal tuft orange. Body below blue-black; pectus orange; abdomen as above from second segment on, white margins broader. Legs black; fore coxa dorsally orange, tipped with black, ventrally white; mid and hind coxae banded with white; fore femur ventrally orange, mid and hind femora ventrally white; mid and hind tibiae with broad medial white band; tibiae posteriorly tipped with white; tibial spurs white, admixed with black in ♀; all first tarsal segments bearing posterior dorsal white spot. Fore wing above: ground-colour blue-black, dark green hue along costa. Basal orange area narrowly subcostal, extending to posterior margin, white at base; orange subcostal and *CuP* streaks to base, demarcating anterior round basal black dot, posterior oblique basal black streak, the latter reaching posterior margin; orange medial margin with *CuP* streak joining white antemedial fascia, anterior and posterior margins basally arcuate, narrowly short of white fascia at costa, becoming white and extending along posterior margin to antemedial and postmedial fasciae; glossy blue-black subbasal fascia demarcated and divided into two quadrate spots by orange streak, anterior spot to costa, posterior spot short of posterior margin. Greyish white antemedial fascia narrowly short of costa, basal margin slightly arcuate anterior and posterior to *CuP*; medial margin broadly indented at cell, a triangular streak on either side, short of or touching white postmedial fascia; greyish white postmedial fascia divided into two major spots at Cu_2, or diffusely joined at this point in ♀, anterior spot large, oval, over discocellular vein, short of costa, posterior spot irregular, more distal in ♀, sometimes divided at Cu_2 and A_1 in ♂, large central portion medially extended on *CuP* and sometimes touching antemedial fascia. Terminal area with greyish white on all veins, always thin or greatly reduced on *CuP*, short of or touching termen,

sometimes joining posterior spot of postmedial fascia on Cu_1 and Cu_2; fringe light grey, sometimes admixed with white at apex. Hind wing above: costal infuscation narrow, black terminal band violaceous, broad at apex, tapering very weakly and gradually towards anal margin; large medial white area broadly extending to anal margin; fringe basally light grey, distally white. Fore wing below: black, slightly violaceous, particularly anterior to cell, brownish fuscous in cubital region, broadly white along posterior margin; short subcostal white streak at base; retinaculum whitish grey; white postmedial fascia a long narrow oval in ♂, divided at Cu_2 in ♀; short, greyish white apical and terminal vein-lines to Cu_2 in ♀, only short faint apical lines in ♂; fringe light grey in ♂, basally white in ♀. Hind wing below as above; costa broadly edged with white; short faint apical and terminal white vein-lines to Cu_2; fringe white.

GENITALIA ♂ (Figs 32, 40, 171, 172, 202, 203, 218). Generally as described for *V. teleroma*. Base of uncus very wide, flattened and laterally constricted. Valve with costa incurved for most of length, apex sharply subtruncate, posteroventral angle broadly rounded; basal portion of clasper joining raised rim of scoop-shaped process, distal portion tubular and tapering, running parallel to posterior margin; catena (Fig. 40) on anellus (Figs 202, 203) constricted at base and distally; cornuti clusters (Fig. 218) variable in length.

GENITALIA ♀ (Figs 267, 268, 313, 314). Generally as described for *V. teleroma*. Antrum (Figs 313, 314) very large, heavily sclerotized, pouch- or sack-shaped, slightly waisted medially or tapering anteriorly, roughly square or noticeably longer than wide; anteriorly with slight dorsal reflexion; ventral wall with strong oblique creases giving rise to sclerotized base of ductus seminalis at mid-length, these creases producing slight asymmetry of antrum.

REMARKS. This species is distinguished by the strong division of the blue-black subbasal fascia of the fore wing by an orange streak on *CuP* joining the orange basal area to the white antemedial fascia; and by the presence of two distinctly demarcated blue-black basal spots. The white fasciae of the fore wing are basically similar to those of other groups where these markings are extensive and the fasciae more or less complete. The basal and subbasal dark markings most closely resemble those in *V. hieratica*, but here the division and demarcation of the spots is less complete; the white fasciae most closely resemble those in *V. plumosa*, but in that species the medial streaking of the antemedial fascia is more accentuated than in *V. suradeva*. The genitalia closely resemble those of *V. teleroma*; the ♂ genitalia are distinguished by the generally wider base of the uncus, the incurved costa, the general shape of valve, the slightly wider ridge of the distal portion of the clasper and its complete joining to the base of the ridge; in the ♀ genitalia by the distinctly longer antrum and weaker dorsal reflexion, and by the origin of the ductus seminalis mid-way on the antrum. We recognize two subspecies, from the following geographical areas: (1) north India, W. Bengal and Assam; Bangladesh; Burma; Thailand and Vietnam; (2) southern India and Sri Lanka. These have been considered distinct species by some authors, synonyms by others.

BIOLOGY. Early stages and host-plant information given under *V. suradeva rama*, below. Moths collected by various collectors throughout the year.

DISTRIBUTION (Fig. 24). Sri Lanka; India; Bangladesh; Burma; Thailand; Vietnam.

Vitessa suradeva suradeva Moore, [1860]
(Figs 24, 40, 131, 132, 171, 202, 267, 313)

Vitessa suradeva Moore, [1860], in Horsfield & Moore, *Cat. lepid. Insects Mus. nat. Hist. East-India House* **2** : 299, pl. 7a, fig. 7; Lederer, 1863 : 335, pl. 6, fig. 6; Walker, 1864 : 219; Moore, 1886 : 58; Swinhoe & Coates, 1889 : 664; Swinhoe, 1890 : 292; Snellen, 1890 : 560; Ragonot, 1891 : 110; Swinhoe, 1900 : 429. LECTOTYPE ♂, INDIA: Assam, Chera Poonjee ('Cherrapunji') (*Buckley*) (Type no. 2637; genitalia slide no. Oxford 718-1977, Shaffer; UM, Oxford), here designated [examined].

Vitessa formosa Felder & Rogenhofer, 1874, *Reise öst. Fregatte Novara*, Zool. Theil, **2**: pl. 137, fig. 1. Holotype ♀, INDIA ('Ind. or.') (genitalia slide no. 16021; BMNH) [examined]. [Synonymized by Hampson, 1896*a* : 146.]

Vitessa suradeva Moore; Hampson, 1896*a* : 146; 1896*b* : 503, partim.

[*Vitessa suradeva* Moore; Kenrick, 1907 : 75. Misidentification: see *Vitessa hemiallactis hemiallactis* Meyrick, above.]

[*Cosmethis suradeva* (Moore); Janse, 1928 : 88. Misidentification: see *Vitessa hollandi hollandi* subsp. n., above.]
Cosmethis suradeva (Moore); de Joannis, 1930 : 637.

♂, ♀. 40–54 mm. As described for species.

GENITALIA ♂ (Figs 40, 171, 202). Generally as described for *V. teleroma* and *V. suradeva*. Base of uncus very wide above lateral constriction. Scoop-shaped process on clasper very large, usually exceeding posterior margin. Left cornuti cluster about two and a half times length of right.

GENITALIA ♀ (Figs 267, 313). Generally as described for *V. teleroma* and *V. suradeva*. Antrum (Fig. 313) very large, roughly square, pouch-shaped, slightly waisted medially; posterior margin of dorsal wall medially convex, recurved, covering opening to antrum; deep, oblique, longitudinal and transverse folds on ventral wall giving rise to raised sclerotized base of ductus seminalis at about mid-length; lower third of antrum with slight dorsal reflexion; posteriorly produced, narrowed and convex beyond broad-shouldered entry of ductus bursae; reflexion and creases causing asymmetry of antrum.

REMARKS (see also Remarks under species). Apart from being generally larger than *V. suradeva rama* and having a somewhat more finely tapering terminal band on the hind wing, this subspecies is indistinguishable externally. The genitalia, however, are distinct in both sexes. The ♂ genitalia have the base of the uncus slightly broader, the costal margin of the valve more strongly curved, the scoop-shaped process of the clasper larger, and the cornuti clusters proportionally larger. In the ♀ genitalia the antrum is more distinctly pouch-shaped, wider but shorter, with a more noticeable dorsal reflexion, and with generally even width.

BIOLOGY. Early stages and host-plant unknown. Moths collected from February to May, August to October and December.

DISTRIBUTION (Fig. 24). Northern India; Bangladesh; Burma; Thailand; Vietnam.

MATERIAL EXAMINED
Paralectotypes. **India**: 1 ♂ (*Argent*) (Type no. 2637; UM, Oxford). [There were originally two more syntypes, one collected by Buckley, one by Argent. These have not been traced; they may be among the material listed below, but we have not been able to establish this.]

India: 1 ♂, Malnold [?] [with label citing original reference for *V. suradeva*], ex Felder coll. (BMNH); 1 ♀, no exact data, ex Felder coll. (BMNH); 2 ♂, 1 ♀, no exact data, ex Swinhoe coll. (TM, Pretoria); 1 ♀, no exact data (TM, Pretoria); 1 ♀, no exact data (*Elwes*) (RNH, Leiden); 1 ♀, Darjeeling, Gopaldhara, 1400 m (*Stevens*) (BMNH); 3 ♀, Darjiling, viii.1912 (*Carmichael*) (UM, Oxford); 3 ♀, Darjiling (*Carmichael*) (RSM, Edinburgh); 1 ♂, 27 ♀, Darjiling (*Möller*) (BMNH); 1 ♂, Darjeeling, v.1935 (*Sevastopulo*) (BMNH); 3 ♂, 5 ♀, Darjiling (BMNH); 1 ♂, 1 ♀, Khasi Hills, Moore coll. (BMNH); 14 ♂, 4 ♀, Khasis, ix–x.1894 (CMAG, Birmingham; MNHN, Paris; UM, Oxford); 3 ♀, Khasi Hill[s], iii, v, vi.1973 (HI, Iruma City); 21 ♂, 19 ♀, Assam, Khasia Hills [1 ♂, ix.1894] (BMNH; NMNH, Washington; TM, Pretoria; UM, Oxford); 1 ♂, Khasis [*sic*] Hills (*Hamilton*) (BMNH); 2 ♀, Assam, Cherrapunji, v.1893 (*C. F. H.*) (BMNH); 3 ♂, Assam (BMNH; NMNH, Washington); 1 ♂, Assam, Jaintia Hills (MM, Manchester); 1 ♂, Cachar (UM, Oxford); 1 ♂, Naga H[ills] (BMNH). **Bangladesh:** 2 ♂, 2 ♀, Sylhet (UM, Oxford); 3 ♂, 1 ♀, Silhet (BMNH). **Burma:** 1 ♀, no exact data (TM, Pretoria); 4 ♀, East Pegu, 1200–1500 m, iii–iv.1890 (*Doherty*) (BMNH); 1 ♀, Mergui, [xii, (*Anderson*),] ex Moore coll. (BMNH); 5 ♂, Mergui (*Doherty*) (TM, Pretoria). **Thailand:** 1 ♀, Khao Sabap, Chentaban, 1935 (*Macbeth*) (BMNH); 1 ♂, Pyayen Range, Pakchong, xii.1957 (*Munroe*) (CNC, Ottawa). **Vietnam:** 2 ♂, Tonkin, Cha pa, ii.1930 (*Lemai*) (MNHN, Paris); 1 ♂, Tonkin, Son La (*Lemai*) (MNHN, Paris); 1 ♀, Tonkin (MNHN, Paris); 1 ♂, 2 ♀, Hanoi [(*Lerminat*)] (MNHN, Paris); 1 ♀, Cochin China [?], Laokai, vi.1936 (*Masseyeff*) (BMNH); 1 ♂, Haut Donai, E. Poilane (NMNH, Washington). No data: 6 ♂, 2 ♀, (BMNH; NMNH, Washington; UM, Oxford).

Vitessa suradeva rama Moore, 1885, **stat. n.**
(Figs 24, 32, 133, 134, 172, 203, 218, 268, 314)

Vitessa rama Moore, 1885, *Lepid. Ceylon* **3** : 256, pl. 178, fig. 4. LECTOTYPE ♂, SRI LANKA ('Ceylon'): Moore coll. 94-106 (BMNH), here designated [examined].

♂, ♀. 30–50 mm. As described for species.

GENITALIA ♂ (Figs 32, 172, 203, 218). Generally as described for *V. teleroma* and *V. suradeva*. Left cornuti cluster (Fig. 218) over three times length of right. See also Remarks, below.

GENITALIA ♀ (Figs 268, 314). Generally as described for *V. teleroma* and *V. suradeva*. Antrum (Fig. 314) very large, sack-shaped, posteriorly wide, gradually tapering anteriorly, distinctly longer than wide. Posterior margin of dorsal wall medially with broadly conical recurved flap, covering opening to antrum; about lower third of antrum with very slight dorsal curve, not causing reflexion; anteriorly narrowly rounded, tip level with opening of ductus bursae; deep, oblique longitudinal and transverse folds on ventral wall giving rise to raised sclerotized base of ductus seminalis, opening posterior to mid-length of antrum; creases causing only slight asymmetry of antrum.

REMARKS. This has often been treated as a distinct species, but the differences from *V. suradeva suradeva* are small, and we consider them as of subspecific value only. This subspecies is on the average smaller than the nominate subspecies, but the measurements given include a series bred in southern India by T. R. Bell; this series contains most of the smallest specimens. The pale markings of the fore wing are very slightly reduced and the black terminal band of the hind wing is generally broader in *V. suradeva rama* than in *V. suradeva suradeva*, otherwise specimens of comparable size are externally indistinguishable. The ♂ genitalia of the present subspecies have the basal part of the uncus slightly narrower, the valve slightly narrower, with a smaller scoop-shaped process on the clasper and, as the most striking feature, the right cornuti cluster much reduced. The ♀ genitalia are distinct by the shape and size of the antrum, which in the present subspecies is larger, narrower and generally shows little sign of dorsal reflexion.

BIOLOGY. The description of immature stages is adapted from the manuscript notes of T. R. Bell preserved in the British Museum (Natural History). Cast larval skins and pupal cases, included with material from south India in the Bell collection, have been examined for comparison with Bell's descriptions. The terminology used here for larval characters is mainly based on Peterson (1962), that for pupal characters on Kuznetsov (1967); the setal nomenclature of the larva and any ambiguous terms follow Bell's own system.

LARVA. Length 35–40 mm; width, middle of body 4·5 mm, head 3·5 mm. Oily-looking; general coloration glossy black with white and orange markings. Head-capsule light orange, broadly semi-oval, surface glossy and smooth. Tubercles wider than setae they bear, circular, not prominent; setae fine; subdorsal setae near apex of front nearly as long as height of head, those of adfrontals shortest, not as long as width of front. Front equilaterally triangular, apex widely arched, each side slightly incurved, reaching more than one-third height of head. Adfrontals half height of head, apex more broadly arched, the whole not clearly defined. Clypeus transverse, transparent or nearly so, posterior margin strongly curved, anterior margin quite straight. Labrum glossy, blackish and kidney-shaped, as long as but narrower than clypeus. Basal segment of antenna orange, second and third segments glossy black. Mandible black, cutting edge entire or nearly so. Six ocelli arranged in a semicircle, of equal size, three, four and six black, remainder yellow with black centres. Legs long, glossy, black, claw rose-tinged. Prolegs thin, held well under abdomen, with infuscated glassy-colourless cylindrical shanks and light coloured planta bearing crochets in complete circle. Strongly interrupted subspiracular white line running whole length of thoracic and abdominal segments; below, an interrupted line of similar spots along the line of legs. White spots on mesothorax and first abdominal segment larger than rest and nearly coalescent to form a short subdorsal line. A supraspiracular, interrupted, white, longitudinal line or narrow band from first to eighth abdominal segments, formed of three spots and lines on each segment. Seventh abdominal segment longer than eighth; eighth segment contracted posteriorly by deeply impressed line, widely convex anteriorly from spiracle to spiracle, dividing off nearly one-third of segment which is twice as long as ninth, appearing somewhat tumid medially; ninth segment with posterior margin shelving shortly to tenth. Ninth segment black; tenth segment, including anal claspers, orange; claspers short, erect, bases thickly conical, ends broadly rounded, planta light orange, two-lobed, with crochets arranged in straight row. Ventral surface of body black. Spiracles broadly oval, reddish brown, with coarse, raised, glossy, black rims; those of prothorax and eighth abdominal segment fully twice as wide and long as any other; those from first to third segments slightly larger than spiracles from fourth to seventh, which are about one-sixteenth as long as segment. Setae white, arising from black tubercles, erect, fine, as long as width of body. Setae of all subspiracular tubercles, especially on ninth and tenth abdominal segments, as long as a segment, subdorsals and dorsolaterals a little over half as long. Setal arrangement of fifth abdominal segment: dorsal

trapezoidal arrangement of setae one-third length of segment; subdorsals the same distance apart; dorsolaterals very little more; supraspiracular a spiracle length in front of and above spiracle; two subspiraculars close together and with no postspiracular setae, a little less than three spiracle lengths below spiracle, one being directly below spiracle, the other a spiracle length in front of first and slightly higher up; of five others, one behind and below the subspiraculars and four on the leg-base.

PUPA. Length 16 mm, width 6 mm. Glossy; dorsally bright orange-chestnut, ventrally lighter. Stout, widest at centre, anteriorly conical, head anteriorly square; abdomen weakly tapering posteriorly, sharply tapering from seventh segment, anal end narrowly rounded. Surfaces of head and thoracic areas minutely corrugated; surfaces of first to eighth abdominal segments minutely pitted, posterior margins of segments, especially of seven and eight, broadly smooth and without pits; segments nine and ten without pits. Dorsal surface: areas well demarcated except between mesonotum and fore wings, metanotum and hind wings; hind wings narrowly visible to past centre of third tergite; fore wings visible to near centre of fourth. Line of fore wing straight on narrow convergence to anterior end of metanotum; anterior margin of metanotum broadly concave. Abdominal tergites two and three noticeably wider than remainder. Spiracles from tergites two to eight with raised dark rims, those of tergites two, three and eight noticeably larger than remainder. Ventral surface; tips of fore wings medially reaching fifth sternite; antennae converging with mid and hind legs, with tips raised from surface, reaching sternite six. Cremaster composed of eight hooks, two central hooks stouter and larger.

HABITS. Larvae communal when young, up to six together in a clean, clear, laxly woven web spun on undersides of young leaves; separating when fully grown, each making a similar web for itself amongst older leaves towards the tops of the plants; preferring to feed on young leaves throughout their existence. Often found sitting highly looped like a semilooper of the noctuid type. Larvae active and moving about the web with alacrity but rarely leaving it. When ready to pupate, larvae descending to ground and making a cocoon of paper-like consistency with light fawn-coloured silk, shining smooth inside and more fluffy outside. Cocoon made against the side of a stone just under the surface of the earth or in a similar place; nearly circular or broadly oval and slightly pointed at the ends; attached by threads of silk all round. Outer threads made first, the larva then retiring into the middle and making the cocoon proper. The latter very roomy, measuring 23 mm × 10 mm × 5 mm. Pupa attached inside by cremaster; imago emerging through a slit at other end. Moth flying by day, seen at Castle Rock at 1500 ft [450 m] in September, feeding from flowers of a large tree called Kadam tree (Rubiaceae), relatively few *V. suradeva* in the company of large numbers of *Macrobrochis gigas* (Walker) (Hypsidae). Pupa described about 20.viii and the first moth emergence on the night of 13.ix.

HOST PLANT OF LARVA. This is a shrub that in Kanara only grows in the evergreen jungles on the Western Ghats but is otherwise widely distributed throughout India and Sri Lanka to Sumatra. It is a small tree, practically a shrub, that grows in the underwood, often forming nearly the whole underwood in parts. The plant is *Chailletia sumatrana* Miquel [= *Dichapetalum gelonioides gelonioides* (Beddome) Engler (Dichapetalaceae)].

GENERAL. Moths collected by various collectors in most months of the year.

DISTRIBUTION (Fig. 24). Sri Lanka; southern India.

MATERIAL EXAMINED

Paralectotypes. **Sri Lanka:** 4 ♂, 1 ♀, data as lectotype (genitalia slide no.'s 1501 [abdomen only, genitalia missing], 1502, 15855; BMNH).

Sri Lanka: 5 ♂, 12 ♀, no exact data (BMNH; CAS, San Francisco; MM, Manchester); 2 ♀, Kandy, 1886 (BMNH); 2 ♂, 2 ♀, Kandy, ix.1902–xii.1909 (*Mackwood*) (BMNH); 1 ♀, Kandy, ix.1914 (*V. H.*) (BMNH); 1 ♂, Dambulla, vii.1903 (*Newman*) (BMNH); 1 ♀, Maskeliya, vii.1885 (BMNH); 2 ♂, 7 ♀, Maskeliya, i–ix (*Mackwood*) (BMNH); 2 ♀, Pundaluoya, xi.1903 (BMNH); 1 ♂, 1 ♀, Ellahara, vii.1903 (*Newman*) (BMNH); 3 ♂, Nalanda, vii.1903 (*Newman*) (BMNH); 1 ♀, no data (*Thwaites*) (UM, Oxford); 1 ♀, no data (UM, Oxford). **India:** 1 ♀, Mui, v.1912 (*Maxwell*) (BMNH); 1 ♂, Tranvancore (*Place*) (BMNH); 1 ♀, Annamali ('Anaimalai') Hills (*Godman*) (BMNH); 1 ♂, Karwar, rains (*Davidson*) (BMNH); 8 ♂, 15 ♀, Karwar, ix.1923–iv.1924 (*Bell*) (BMNH); 1 ♂, Kanara (*Bell*) (BMNH); 10 ♂, 6 ♀, Castle Rock, v–vi.1920 (*Bell*) (BMNH); 2 ♂, 1 ♀, no data (*Mackwood*) (BMNH); 2 ♂, no data (BMNH; MNHN, Paris).

Various cocoons, pupal cases and last instar larval skins, from localities in southern India (*Bell*) (BMNH).

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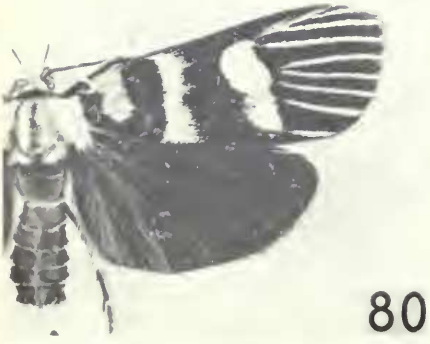
Figs 45–51 (45) *Vitessidia diaphana* Rothschild & Jordan, ♂, New Guinea. (46) *V. diaphana* Rothschild & Jordan, ♀, New Guinea. (47) *V. geometrina* sp. n., ♀ holotype, New Guinea. (48) *Cosmethella unipectinalis* (Hampson), ♂, Solomon Islands. (49) *C. unipectinalis* (Hampson), ♀, Solomon Islands. (50) *C. minor* sp. n., ♀ holotype, New Guinea. (51) *C. major* sp. n., ♀ holotype, New Guinea.

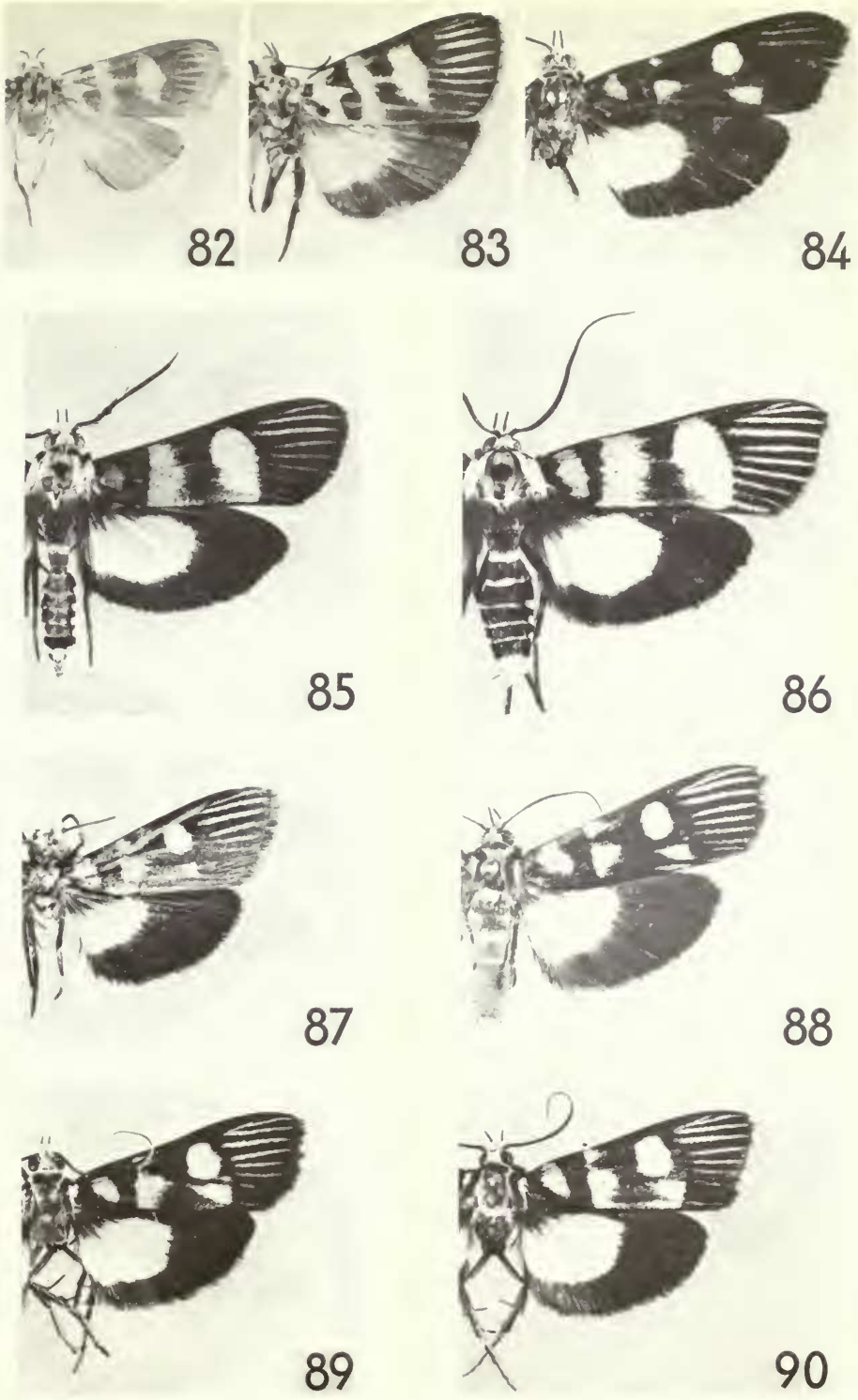
Figs 52–57 (52) *Vitessa griseata* Kenrick, ♂, New Guinea. (53) *V. griseata* Kenrick, ♀, New Guinea. (54) *V. brandti* sp. n., ♂ holotype, New Britain. (55) *V. talboti* (Janse), ♂ lectotype, Moluccas. (56) *V. talboti* (Janse), ♀ paralectotype, Moluccas. (57) *V. nobilis* sp. n., ♀ holotype, Moluccas.

Figs 58–65 (58) *Vitessa cyanea ceramensis* subsp. n., ♂ allotype, Moluccas. (59) *V. cyanea ceramensis* subsp. n., ♀ holotype, Moluccas. (60) *V. cyanea cyanea* Hampson, ♂, D'Entrecasteaux Islands. (61) *V. cyanea cyanea* Hampson, ♀, D'Entrecasteaux Islands. (62) *V. zemire expansa* subsp. n., ♂, Moluccas. (63) *V. zemire expansa* subsp. n., ♀ paratype, Moluccas. (64) *V. zemire zemire* (Stoll), ♂, Moluccas. (65) *V. zemire zemire* (Stoll), ♀, Moluccas.

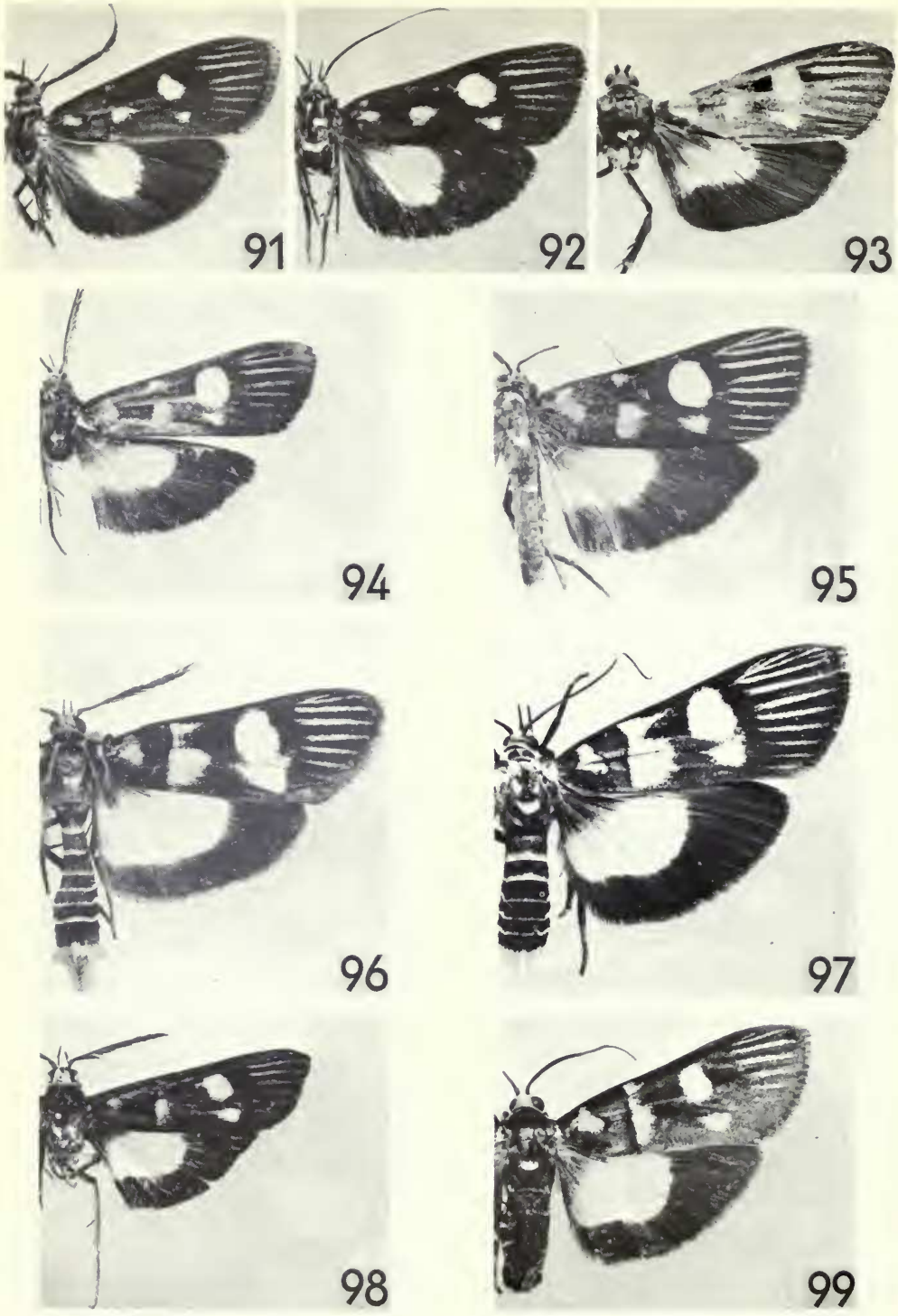
Figs 66–73 (66) *Vitessa zemire temerata* Swinhoe, ♂, New Guinea. (67) *V. zemire temerata* Swinhoe, ♀, New Guinea. (68) *V. zemire nephritica* subsp. n., ♂ paratype, Australia. (69) *V. zemire nephritica* subsp. n., ♀ paratype, Australia. (70) *V. zemire coronis* subsp. n., ♂ holotype, Umboi Island. (71) *V. zemire coronis* subsp. n., ♀ allotype, Umboi Island. (72) *V. zemire novaebritanniae* subsp. n., ♂ holotype, New Britain. (73) *V. zemire novaebritanniae* subsp. n., ♀ allotype, New Britain.



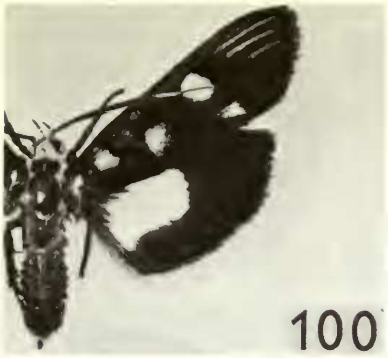
Figs 74–81 (74) *Vitessa zemire solomonis* subsp. n., ♂ holotype, Solomon Islands. (75) *V. zemire solomonis* subsp. n., ♀ paratype, Solomon Islands. (76) *V. zemire cheesmanae* subsp. n., ♂ paratype, New Hebrides. (77) *V. zemire cheesmanae* subsp. n., ♀ paratype, New Hebrides. (78) *V. vitialis* Hampson, ♂, Fiji. (79) *V. vitialis* Hampson, ♂, Fiji (Lau group). (80) *V. vitialis* Hampson, ♀, Fiji. (81) *V. tamsi* sp. n., ♀ paratype, Western Samoa.

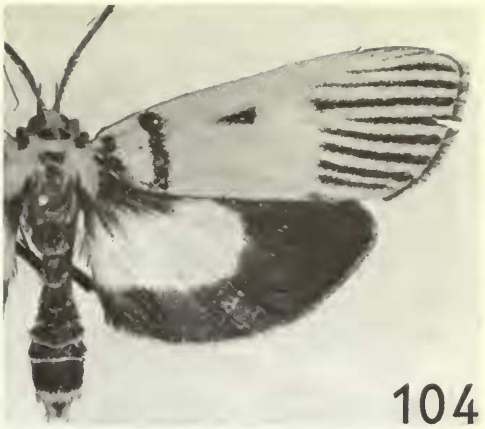


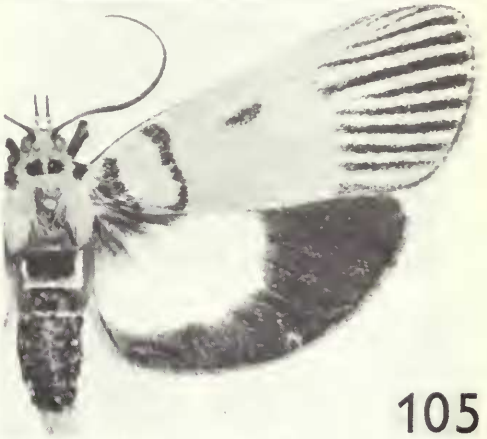
Figs 82–90 (82) *Vitessa hieratica* Swinhoe, ♂, Borneo: Sarawak. (83) *V. hieratica* Swinhoe, ♀, Sumatra. (84) *V. philippina* sp. n., ♀ holotype, Philippines. (85) *V. stettina* Swinhoe, ♂, New Guinea. (86) *V. stettina* Swinhoe, ♀, New Guinea. (87) *V. hollandi wallacealis* subsp. n., ♂ holotype, Sulawesi. (88) *V. hollandi wallacealis* subsp. n., ♀ allotype, Sulawesi. (89) *V. hollandi hollandi* subsp. n., ♂ holotype, New Guinea. (90) *V. hollandi hollandi* subsp. n., ♀ paratype, New Guinea.



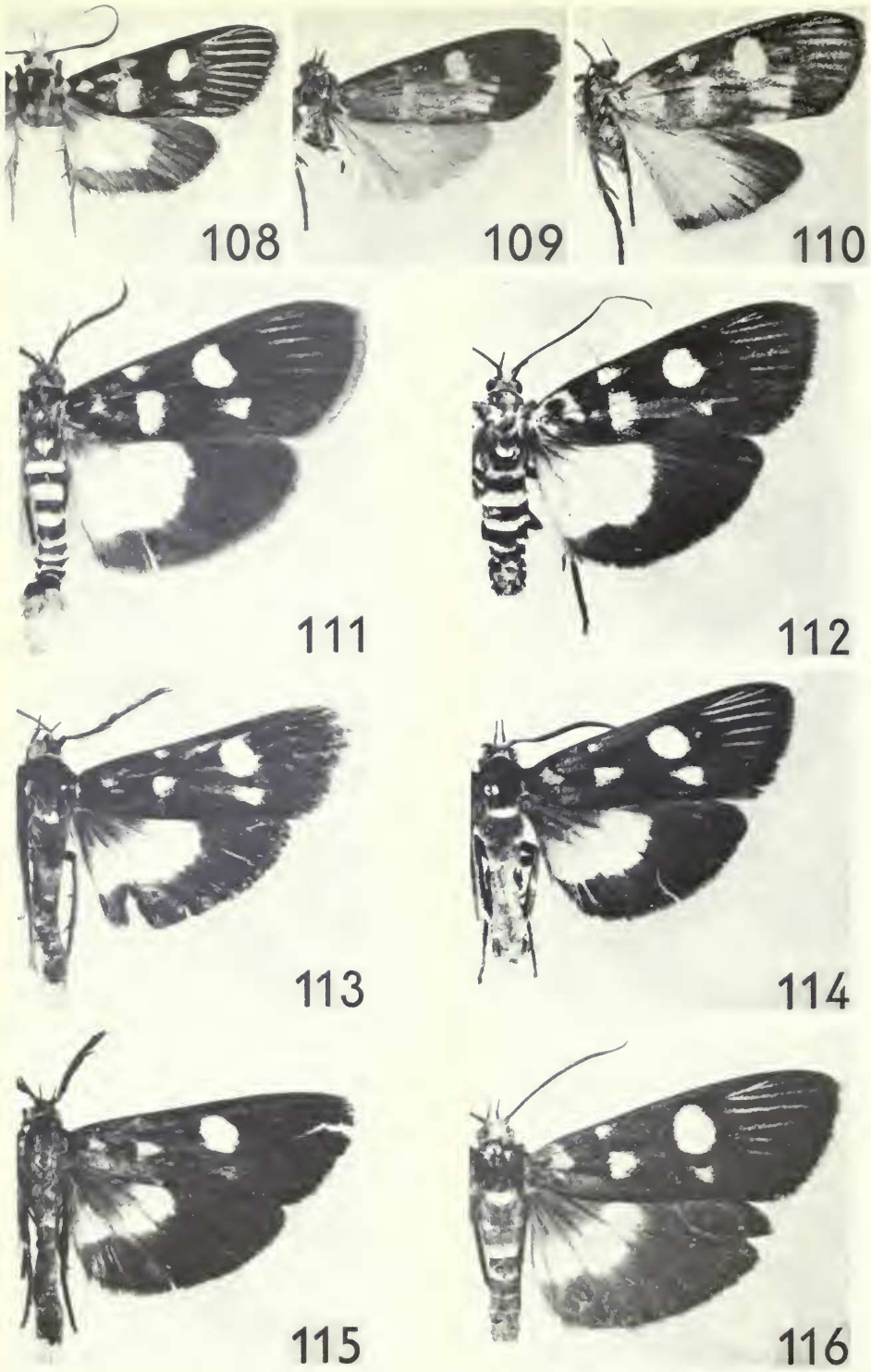
Figs 91–99 (91) *Vitessa ternatica* Lederer, ♂, New Guinea. (92) *V. ternatica* Lederer, ♀ (paralectotype of *sarumensis* Holland), Moluccas. (93) *V.* sp., ♂, Japan [?]. (94) *V. hemiallactis moluccana* subsp. n., ♂ holotype, Moluccas. (95) *V. hemiallactis moluccana* subsp. n., ♀ allotype, Moluccas. (96) *V. hemiallactis hemiallactis* Meyrick, ♂, New Guinea. (97) *V. hemiallactis hemiallactis* Meyrick, ♀, New Guinea. (98) *V. hemiallactis admiralitatis* subsp. n., ♂ paratype, Admiralty Islands. (99) *V. hemiallactis admiralitatis* subsp. n., ♀ paratype, Admiralty Islands.



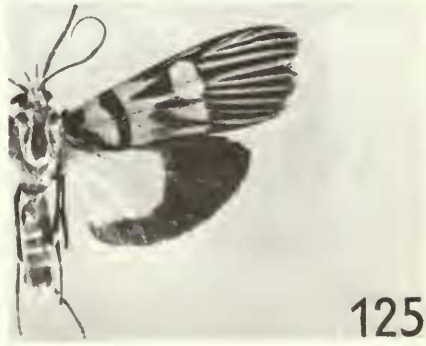




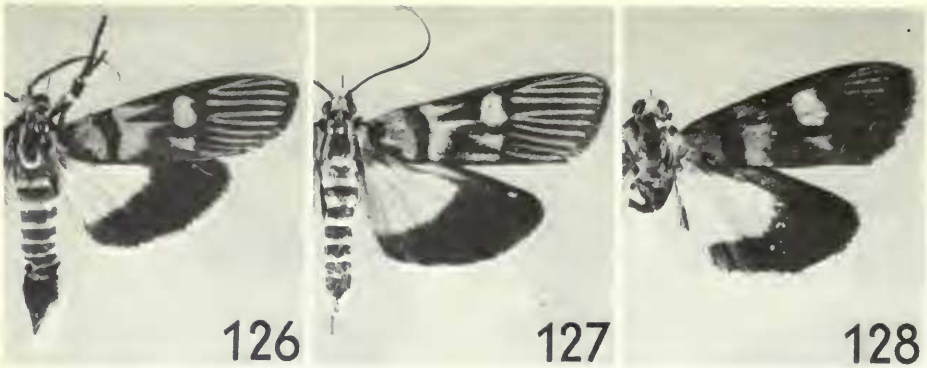
Figs 100–107 (100) *Vitessa hemiallactis lustrans* subsp. n., ♂, New Ireland. (101) *V. hemiallactis lustrans* subsp. n., ♀ allotype, New Hannover. (102) *V. intermedia* sp. n., ♂ holotype, New Guinea. (103) *V. intermedia* sp. n., ♀ allotype, New Guinea. (104) *V. barretti* sp. n., ♂ holotype, New Guinea. (105) *V. barretti* sp. n., ♀ allotype, New Guinea. (106) *V. glaucoptera* Hampson, ♂, Australia. (107) *V. glaucoptera* Hampson, ♀, Australia.

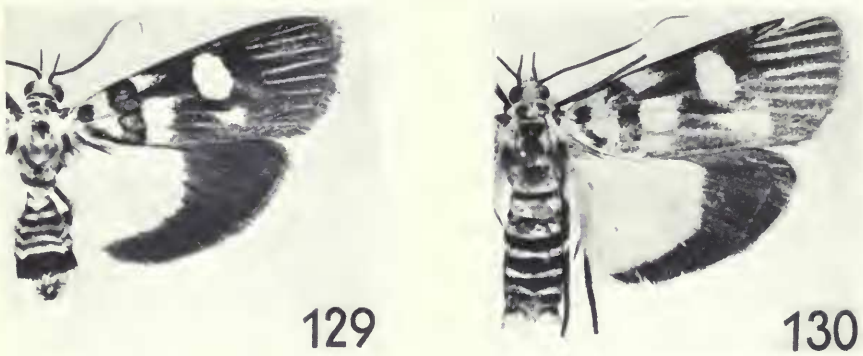


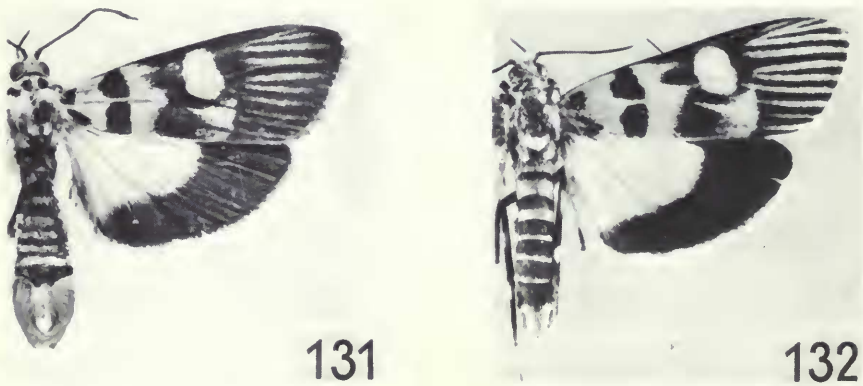
Figs 108–116 (108) *Vitessa cristobalensis* sp. n., ♀ holotype, Solomon Islands. (109) *V. nicobarica* Hampson, ♂ paralectotype, Nicobar Islands. (110) *V. nicobarica* Hampson, ♀ paralectotype, Nicobar Islands. (111) *V. pyraliata latialbata* subsp. n., ♂ holotype, Malaya. (112) *V. pyraliata latialbata* subsp. n., ♀ paratype, Malaya. (113) *V. pyraliata triangulifera* subsp. n., ♂ holotype, Philippines. (114) *V. pyraliata triangulifera* subsp. n., ♀ paratype, Philippines. (115) *V. pyraliata pyraliata* Walker, ♂, Sulawesi. (116) *V. pyraliata pyraliata* Walker, ♀, Sulawesi.



Figs 117–125 (117) *Vitessa kolakalis* sp. n., ♂ holotype, Sulawesi. (118) *V. kolakalis* sp. n., ♀ allotype, Sulawesi. (119) *V. sulaensis* sp. n., ♀ holotype, Moluccas. (120) *V. muluana* sp. n., ♀ holotype, Borneo: Sarawak. (121) *V. gemiua* sp. n., ♀ holotype, Schouten Islands. (122) *V. gemina* sp. n., ♀ paratype, Schouten Islands. (123) *V. spleudida* Schultze, ♀, Philippines. (124) *V. plumosa plumosa* Hampson, ♂, Lesser Sunda Islands. (125) *V. plumosa plumosa* Hampson, ♀, Lesser Sunda Islands.







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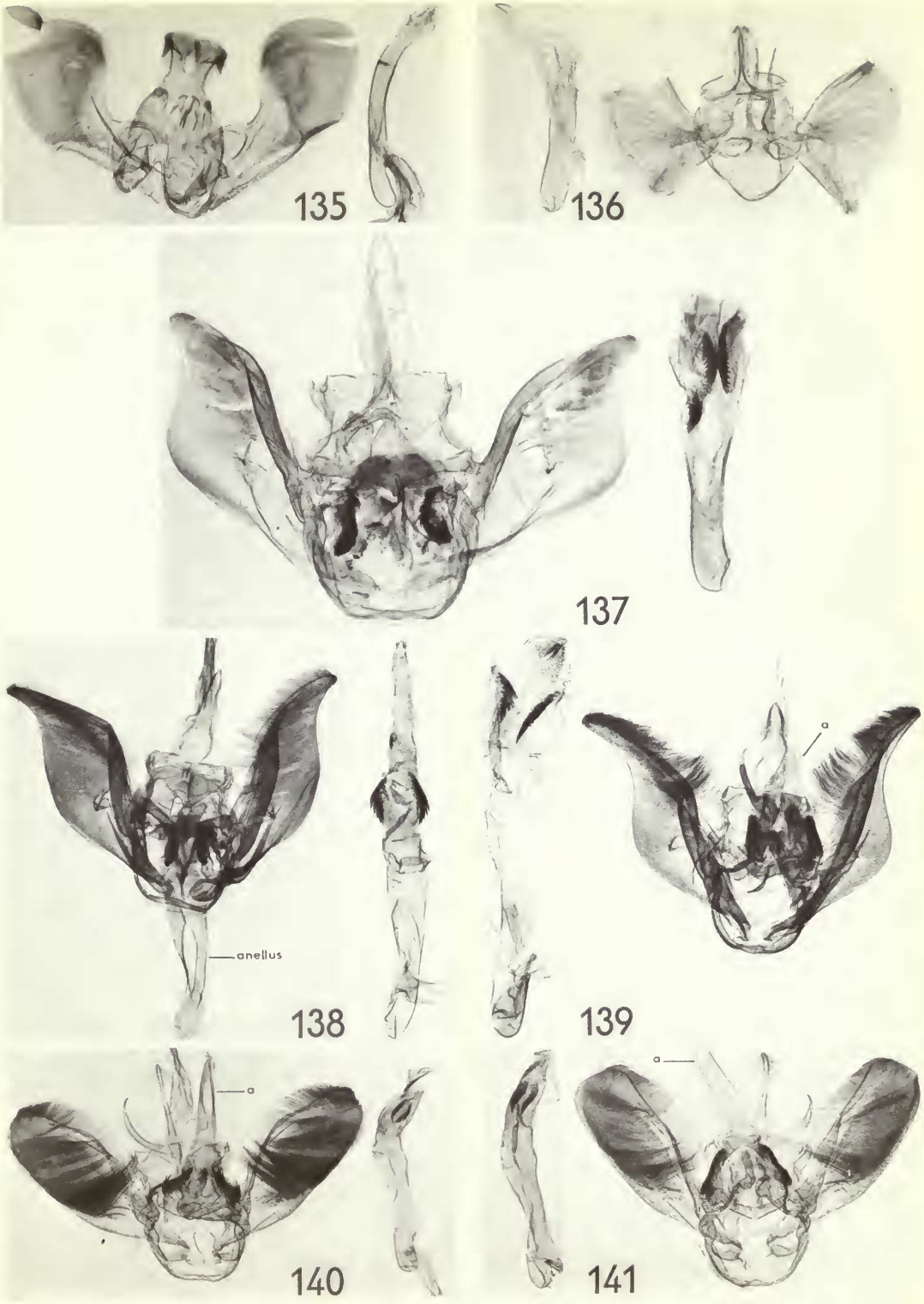

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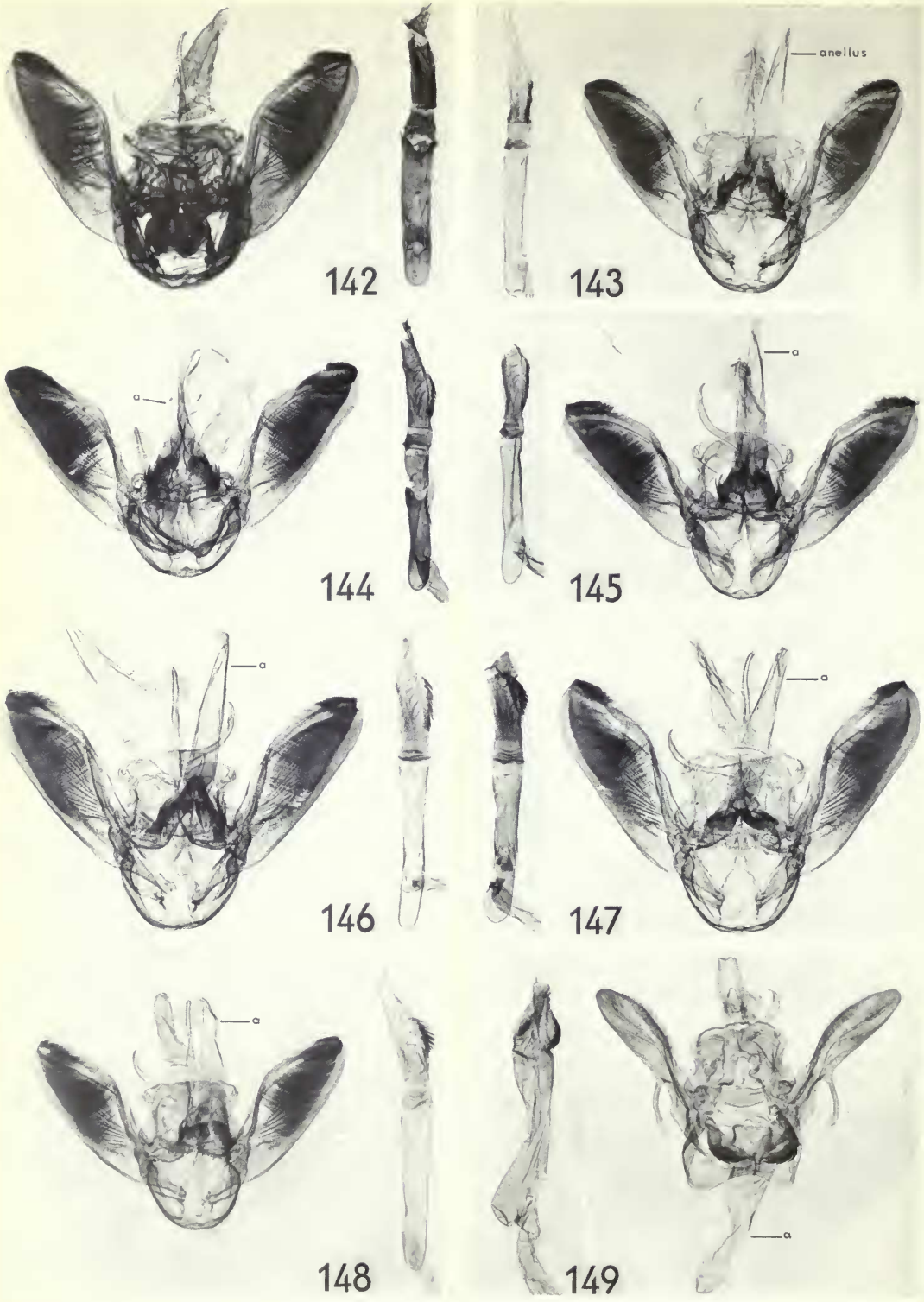

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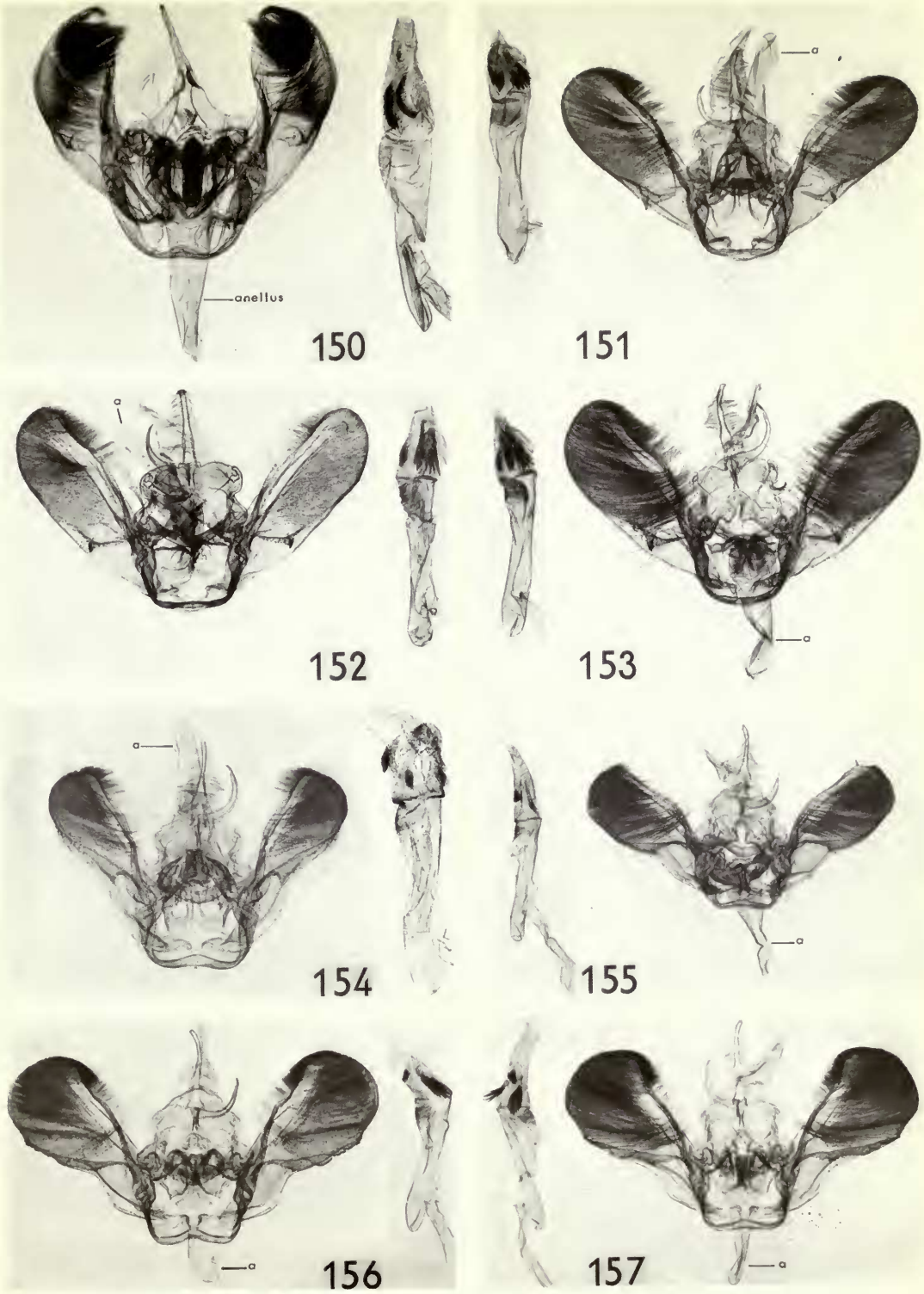

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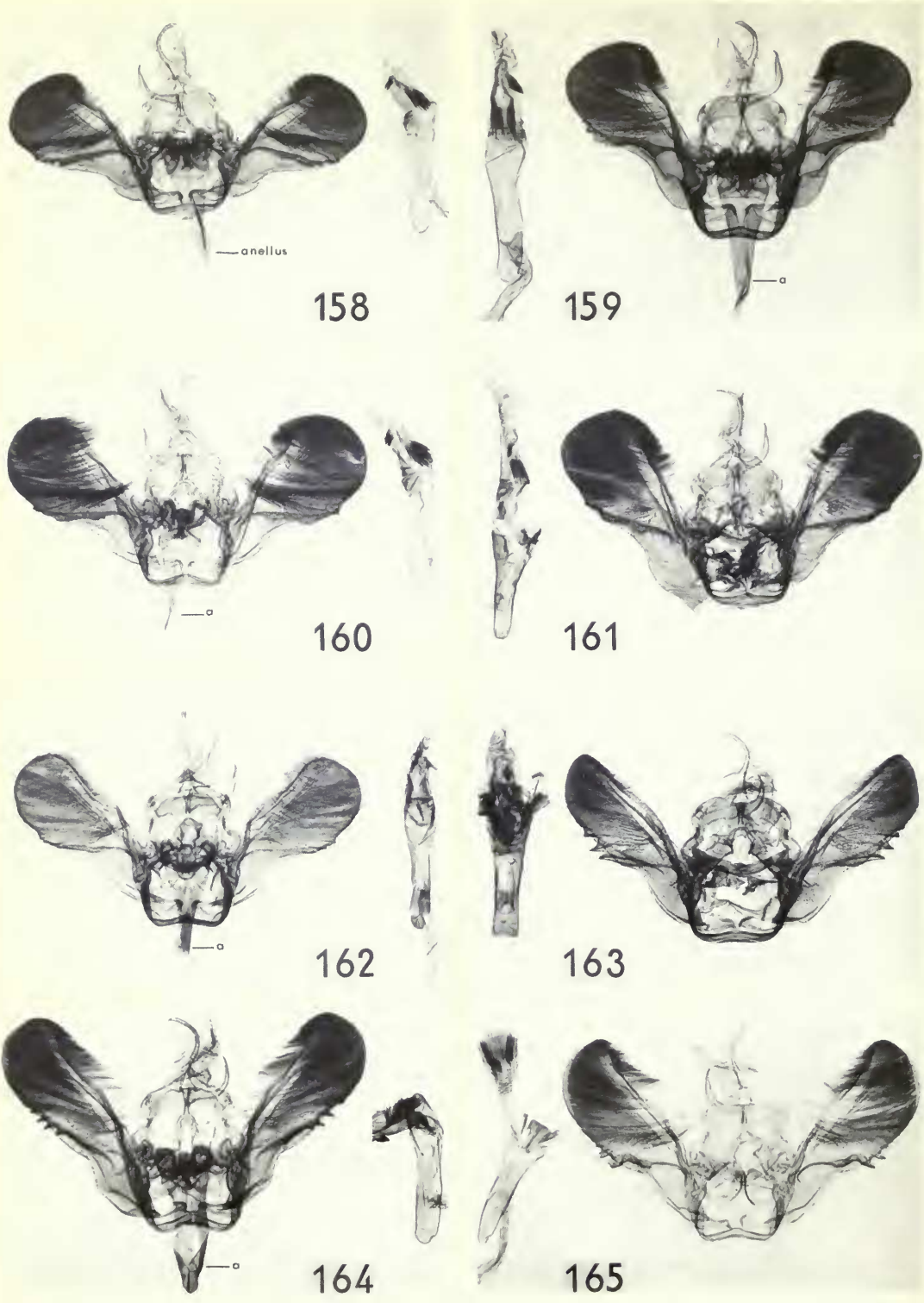

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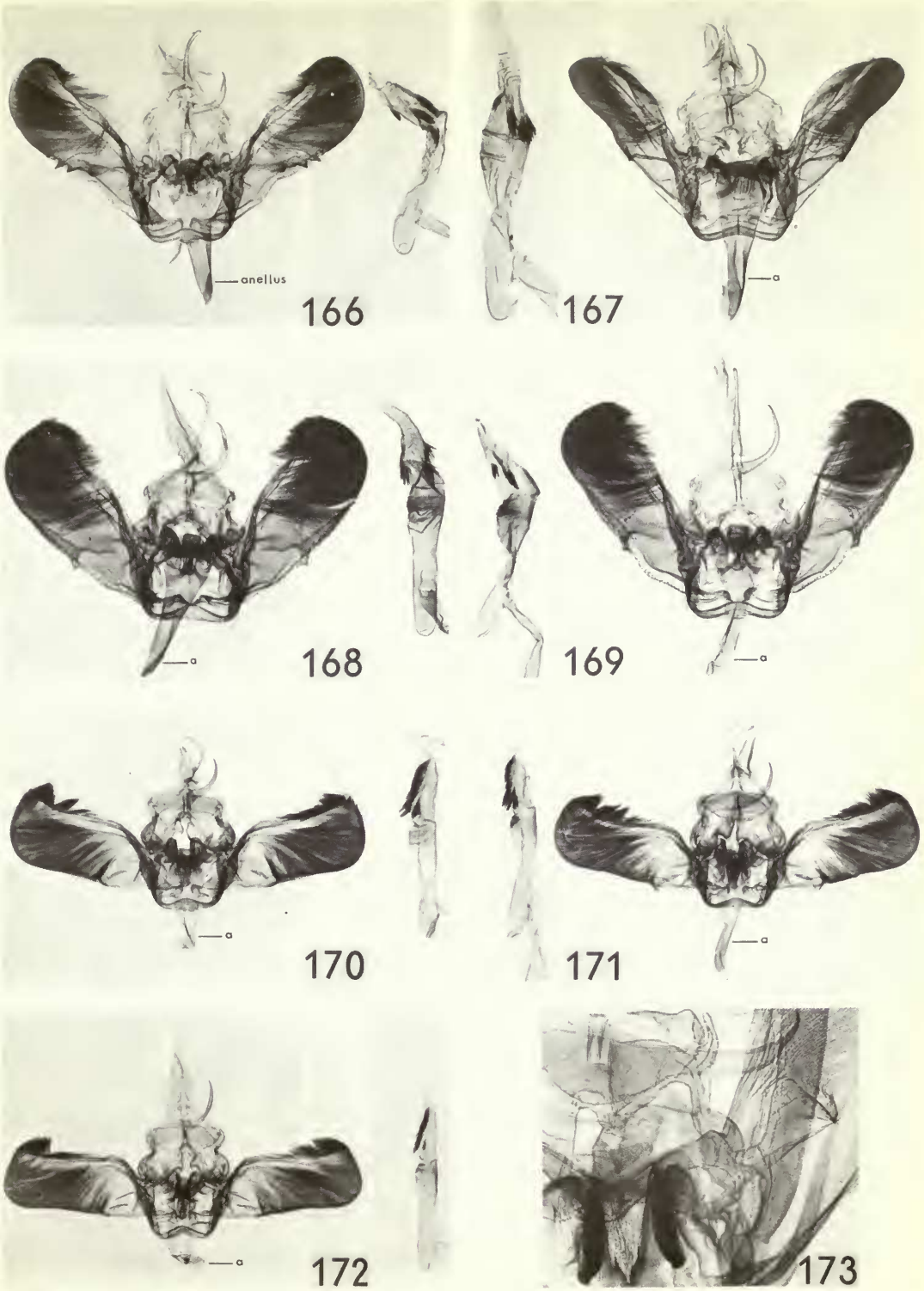

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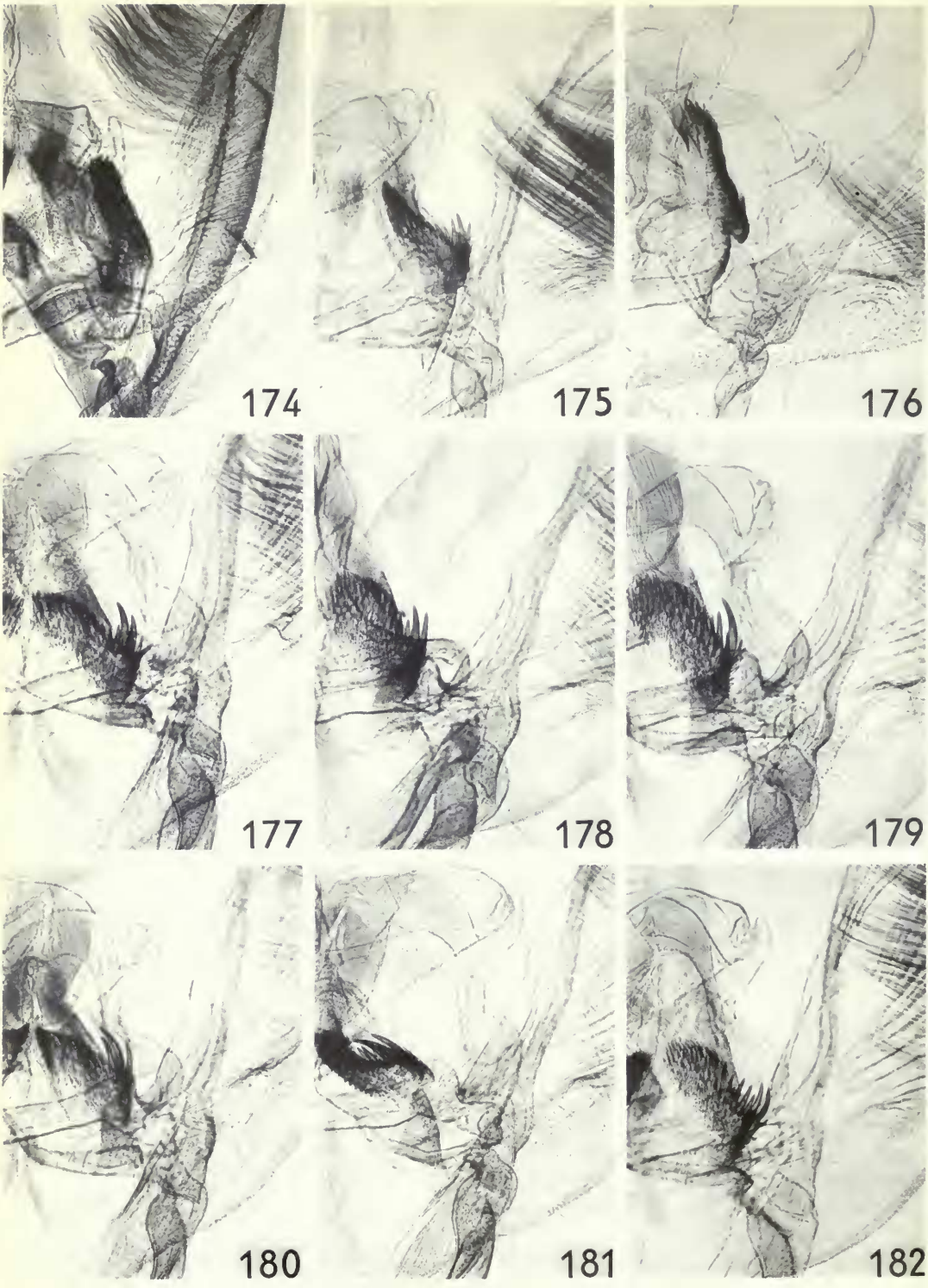

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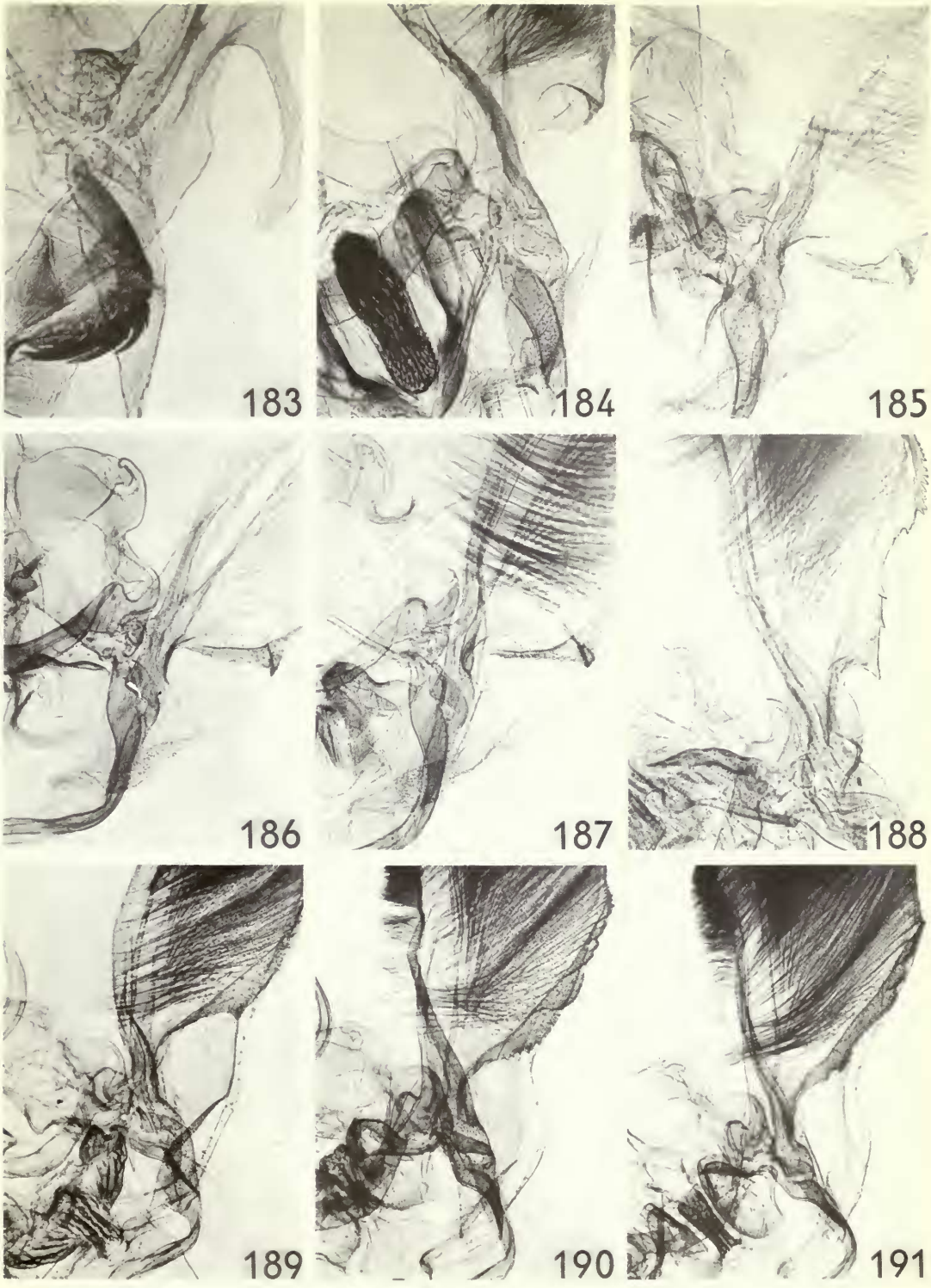

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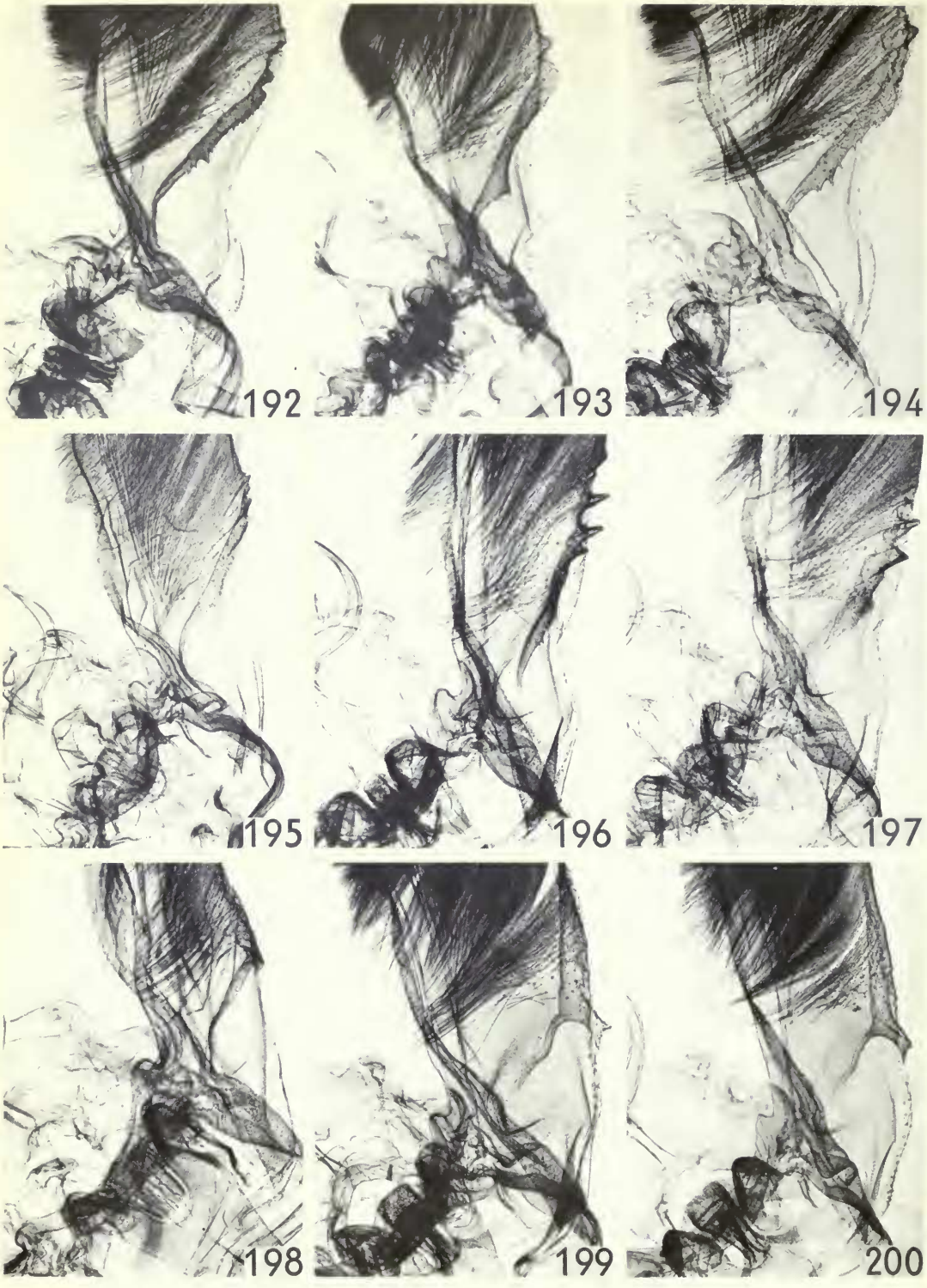

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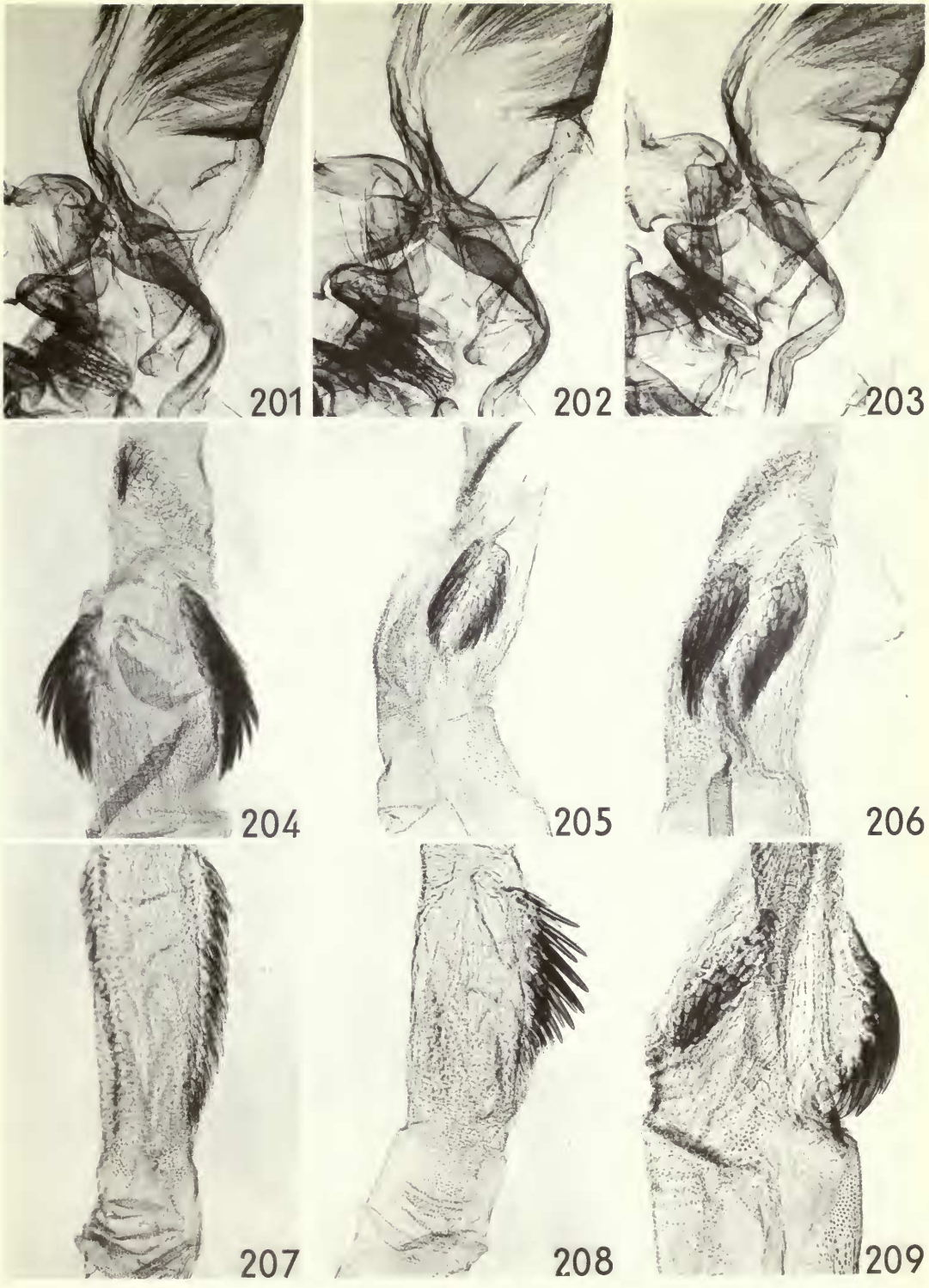

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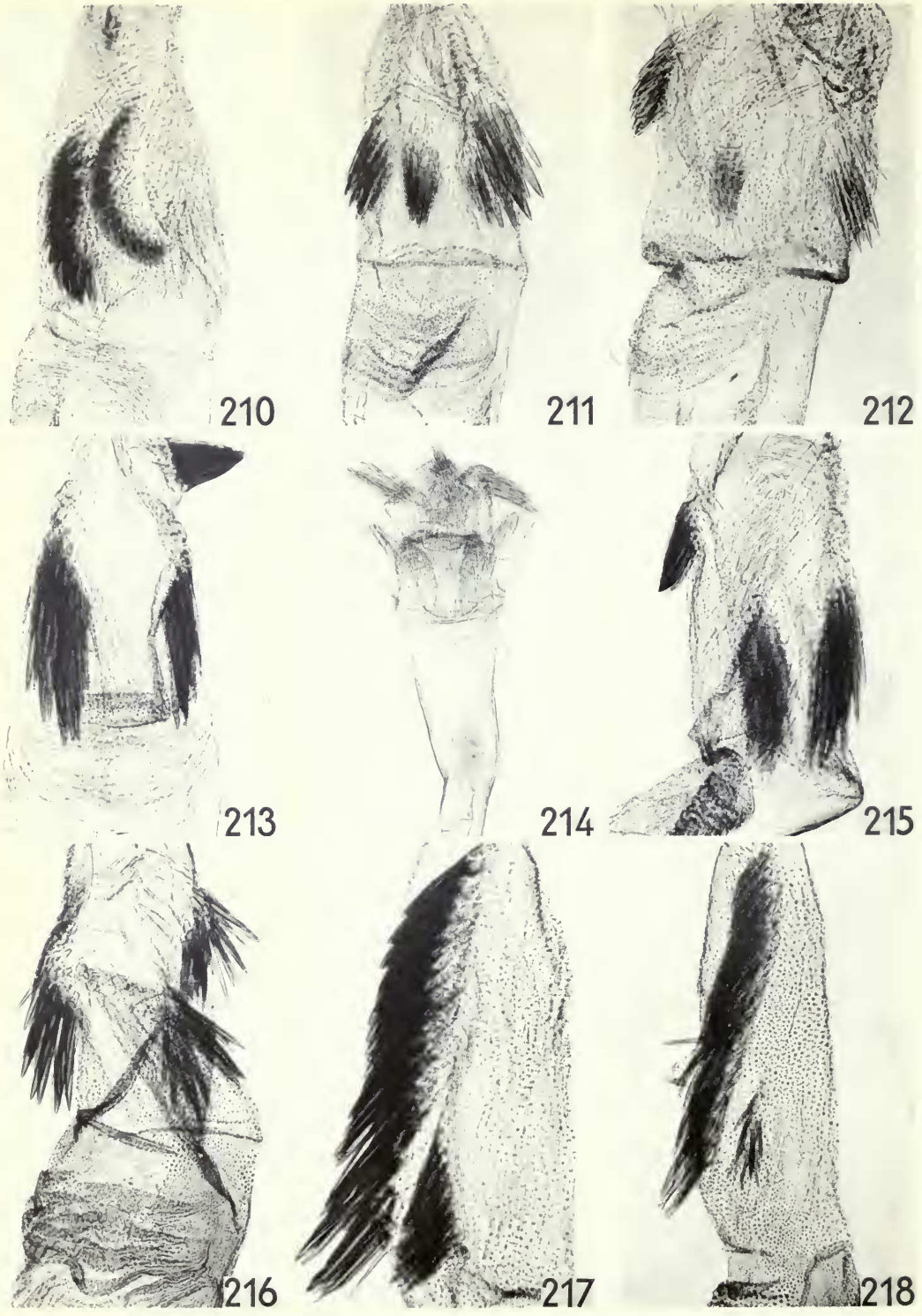

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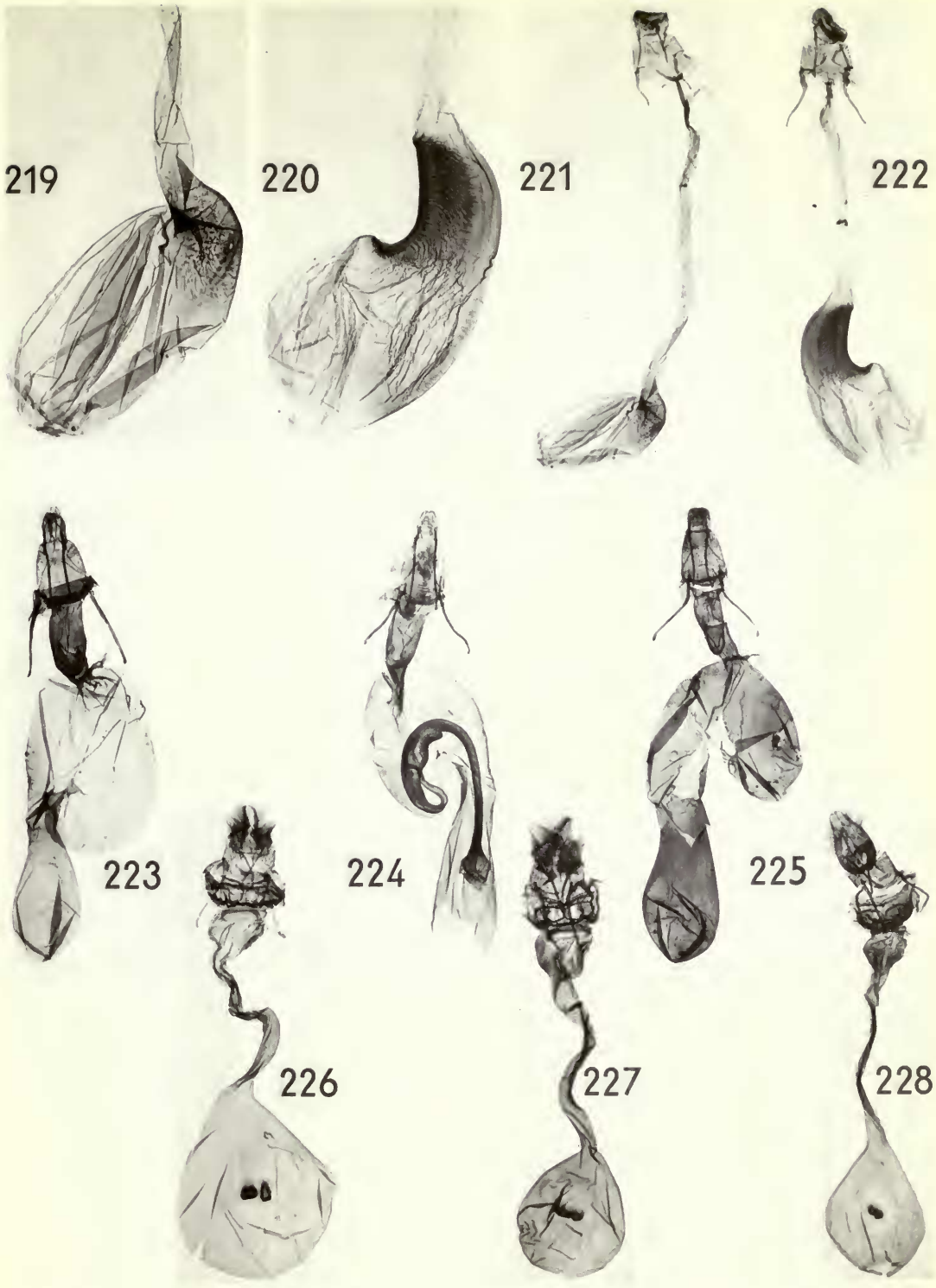

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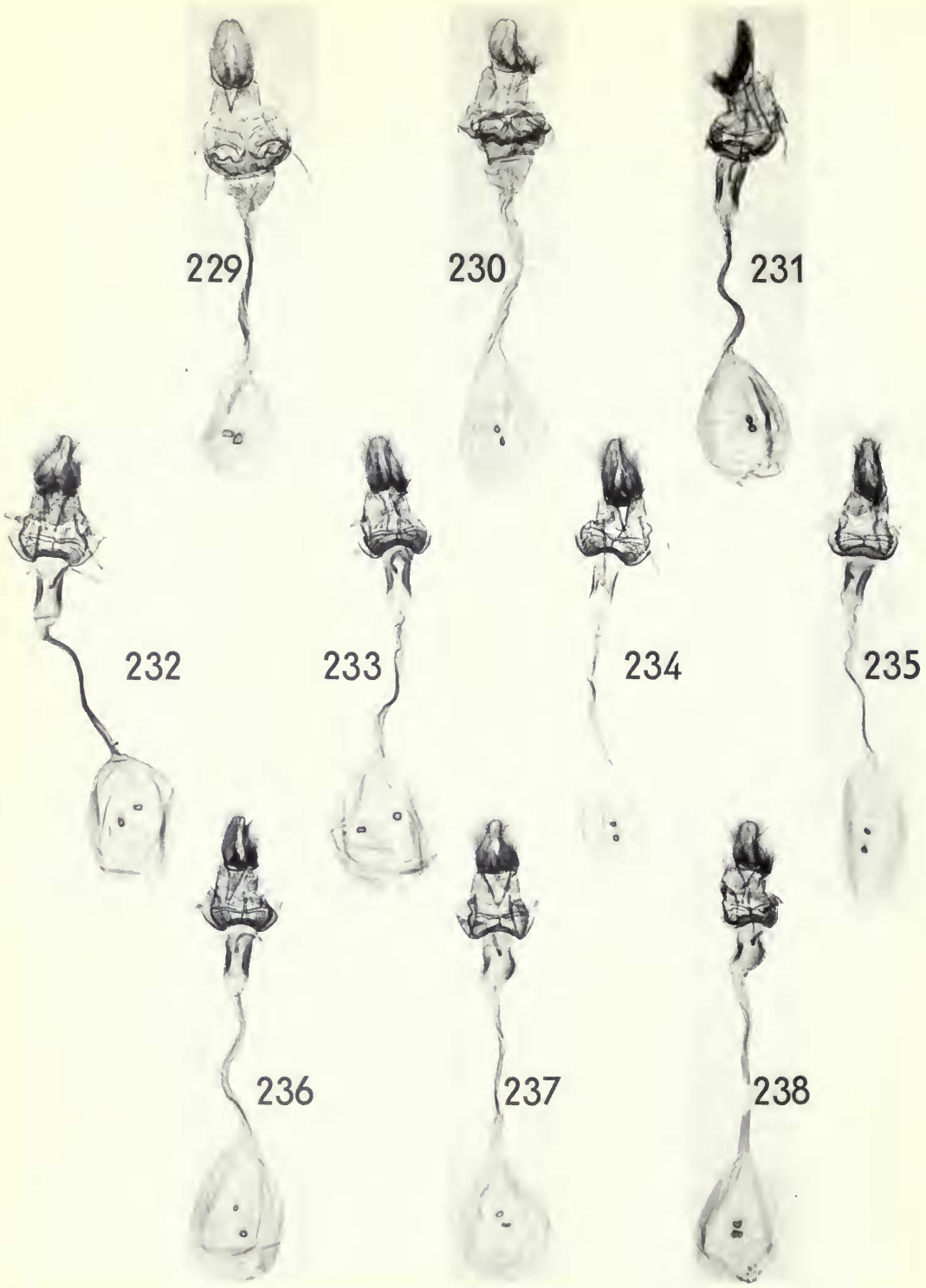

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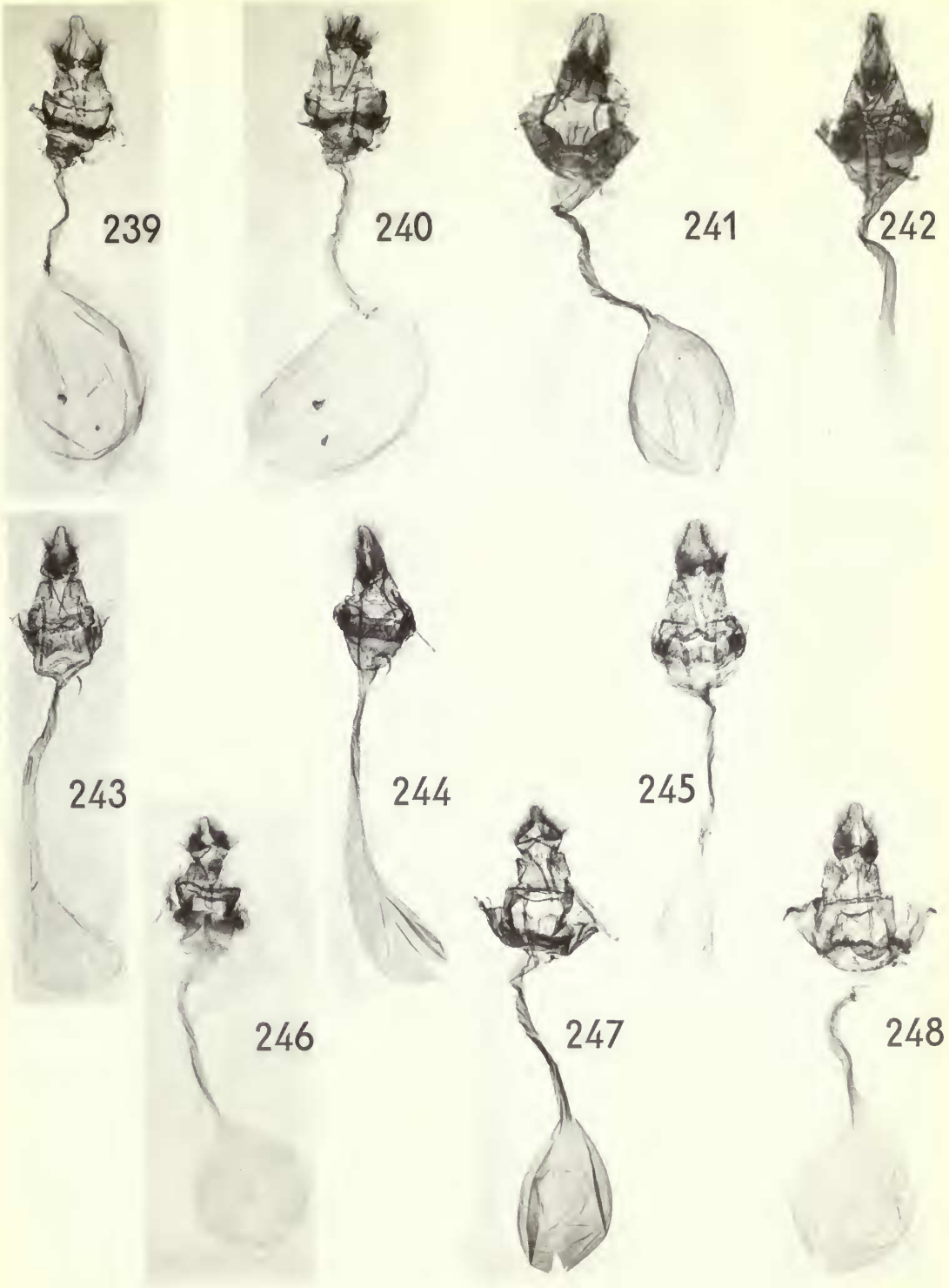

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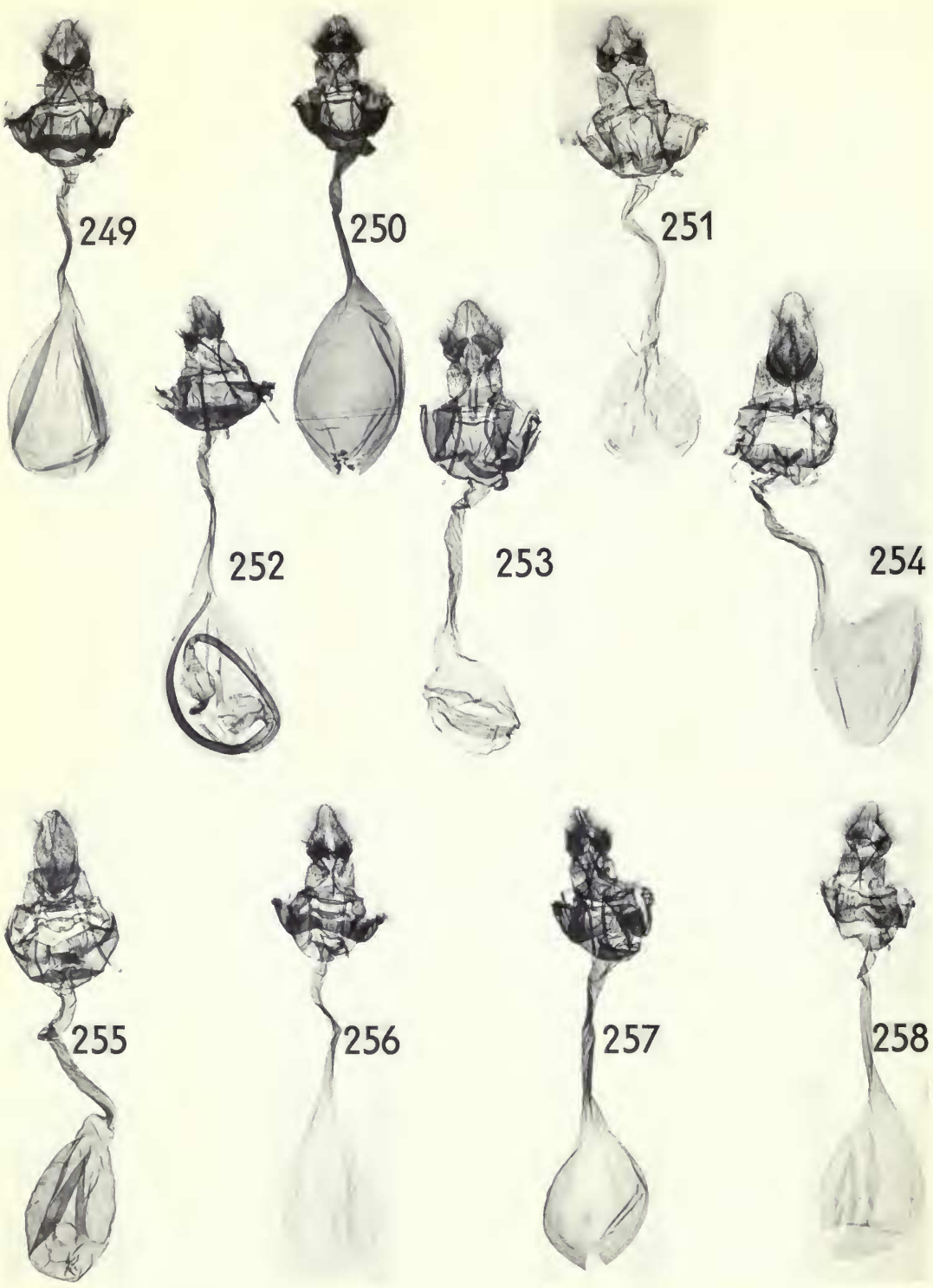

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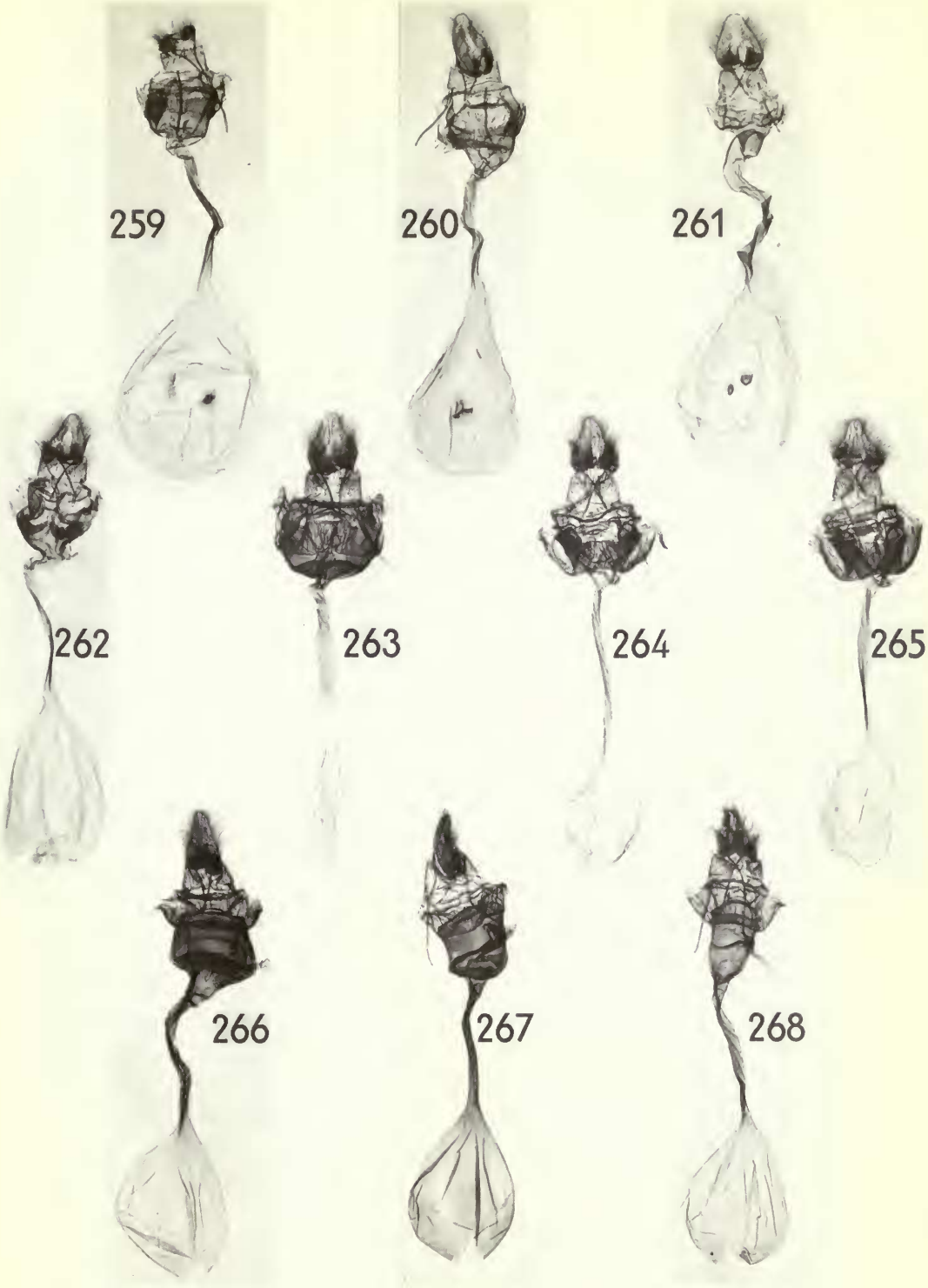

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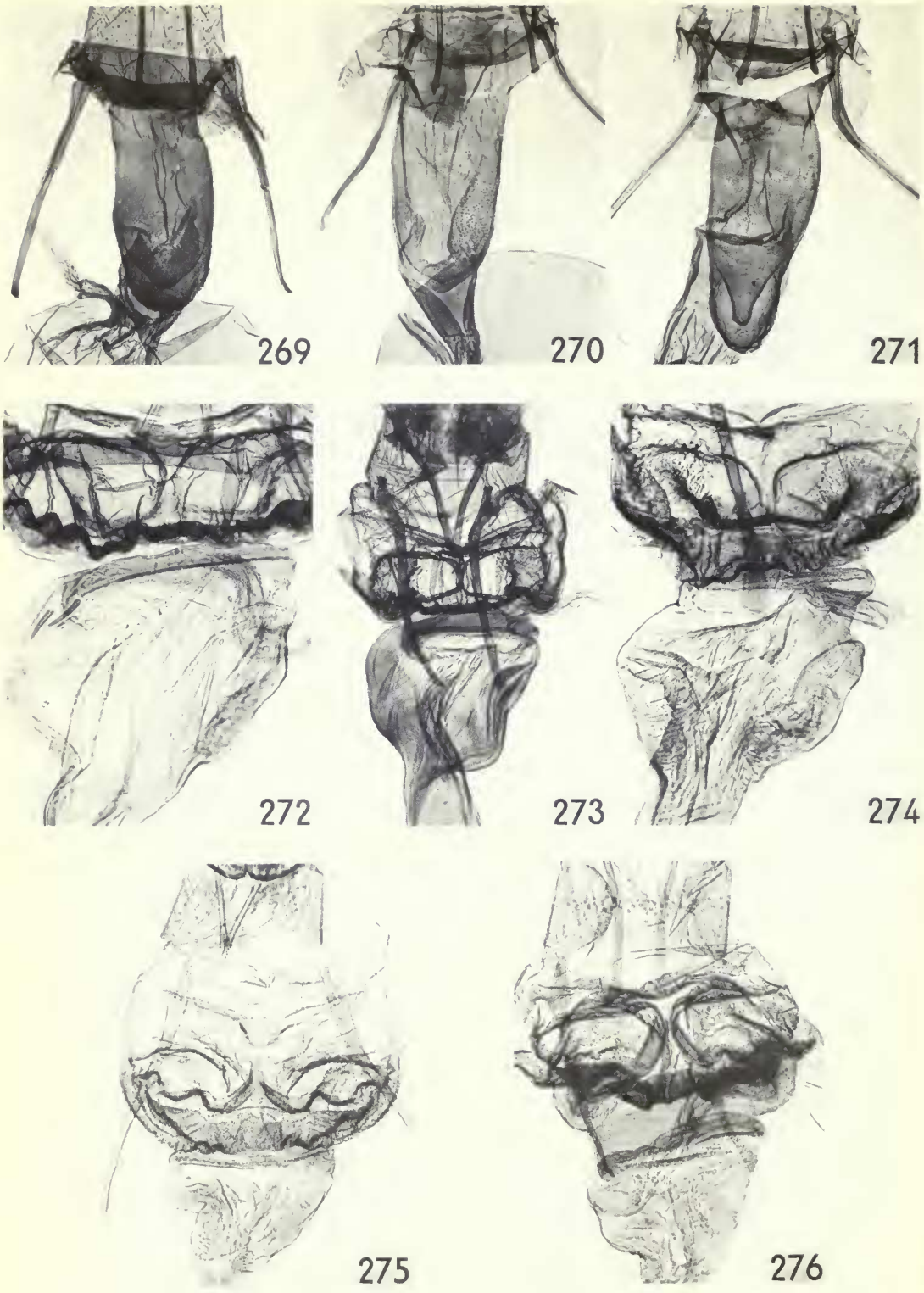

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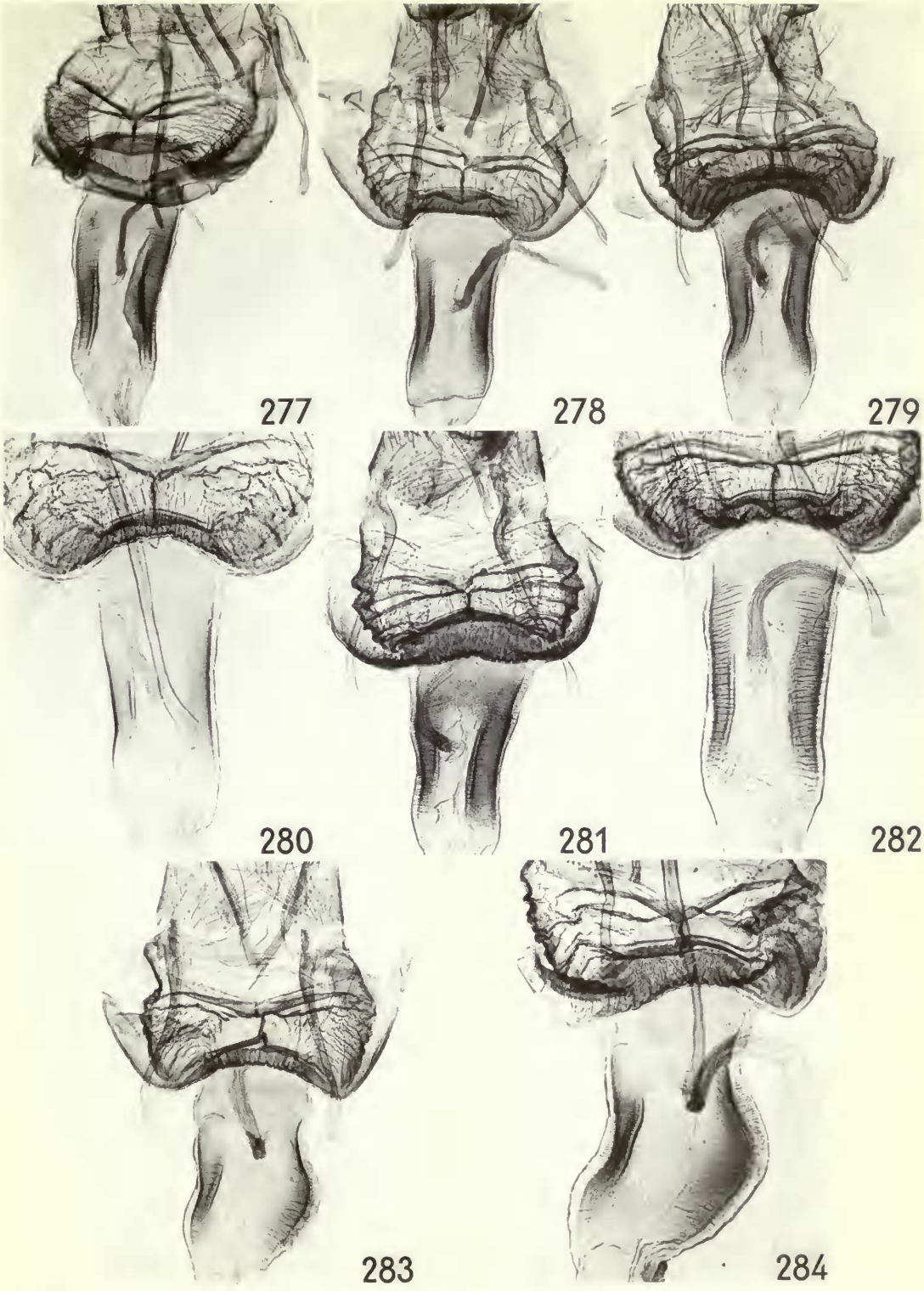

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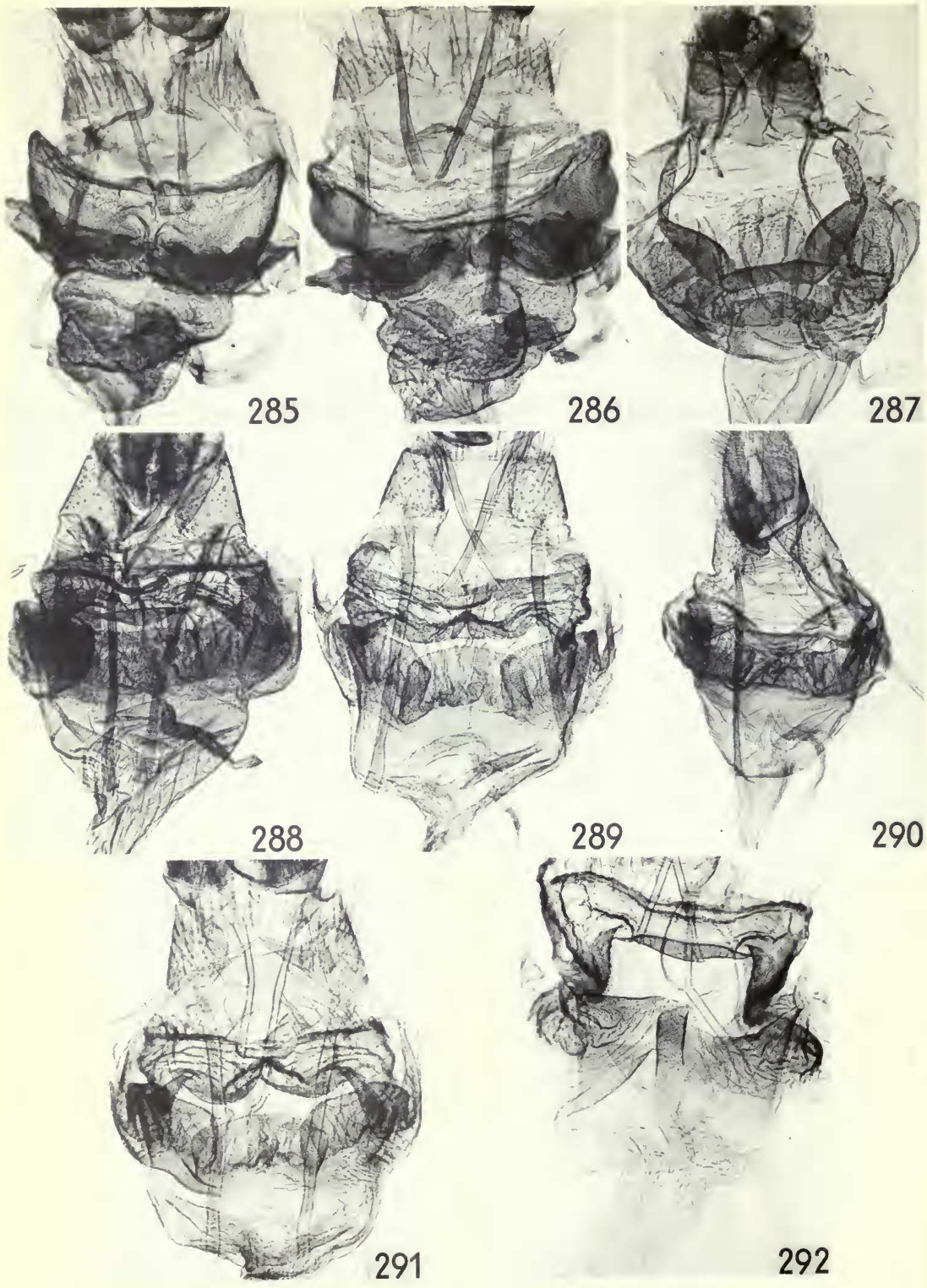

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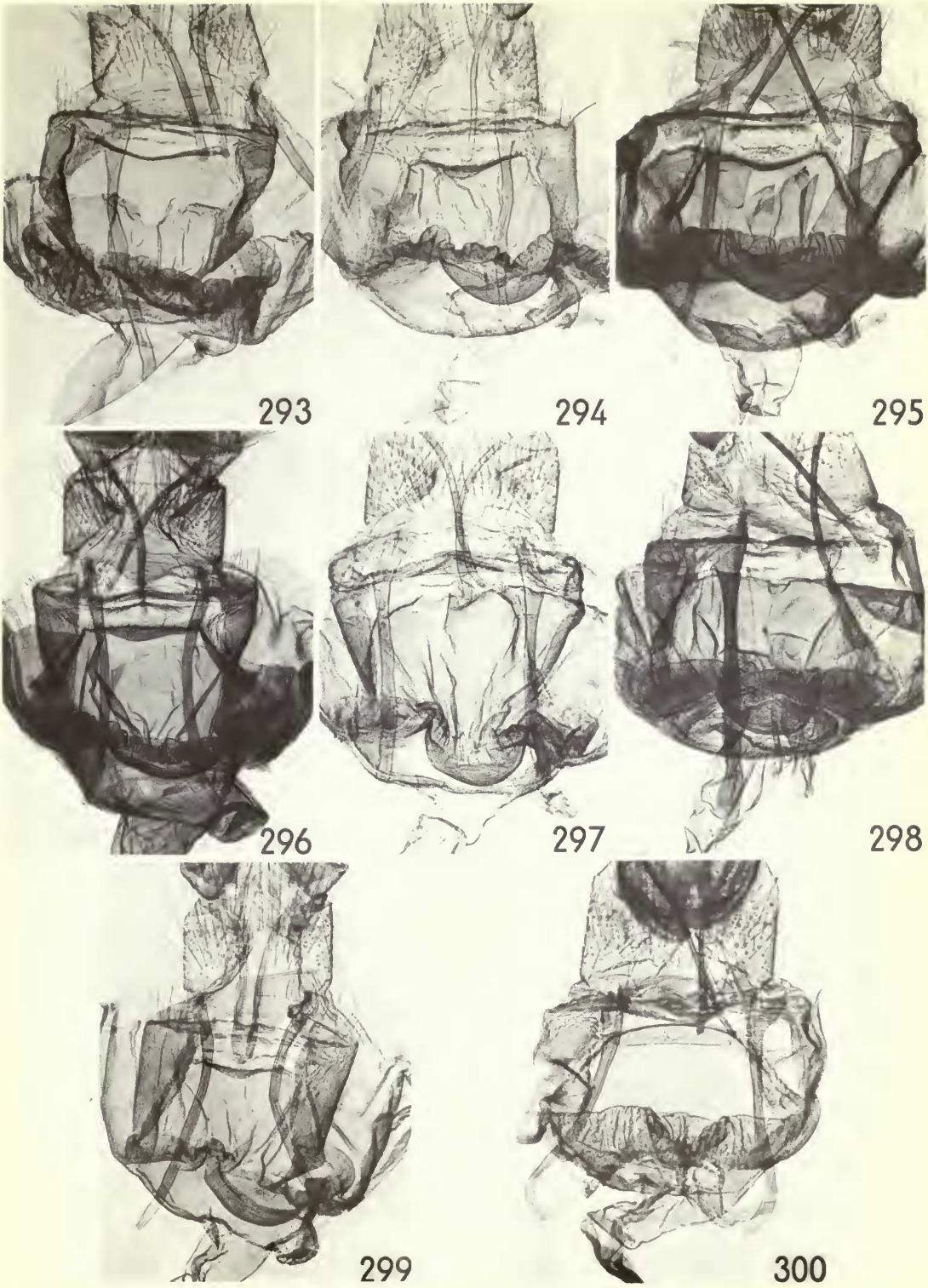

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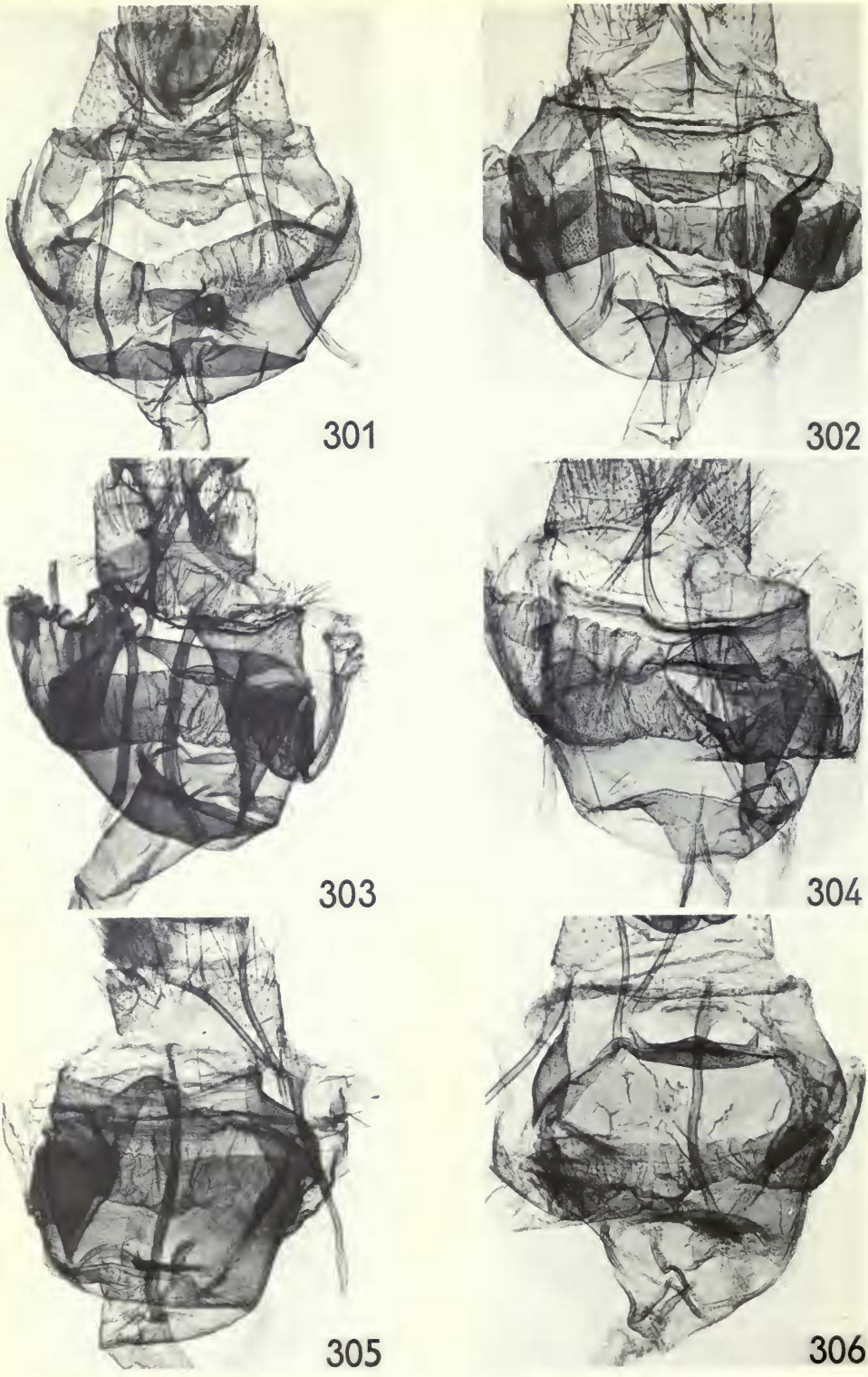

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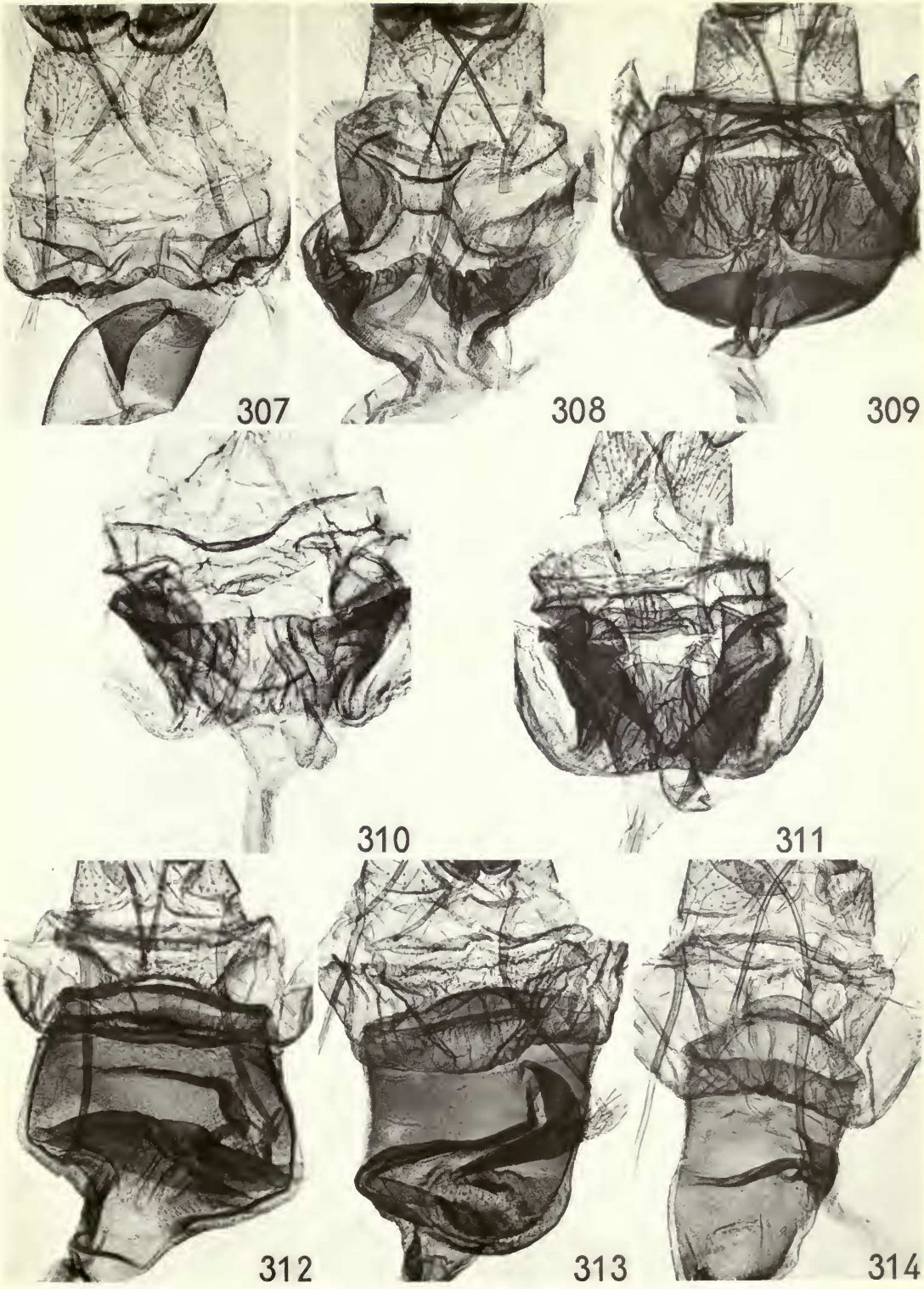

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